THE

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THE

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(J. A. BERLY'S).

1908 EDITION

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CONTRACTORS v. WORKS ENGINEERS.

ENGINEERING undertakings, devoted to the production of machinery, almost invariably install their own electrical equipment for driving and lighting, whilst a similar course is not infrequently pursued by other manufacturing concerns, which employ a repairing staff under the supervision of an engineer. At first sight, this practice might appear to make for economy, but careful consideration will often reveal evidence showing the contrary to be the case.

An experienced mechanical engineer, who has served a proper apprenticeship, should be able to make a wood pattern correctly for the rest of his life, the result being equal to similar work turned out by an expert pattern-maker. The difference in the time occupied, however, will be very marked, the job being completed very much more quickly by the regular workman.

When electrical equipment on a considerable scale is undertaken by the ordinary factory engineer, we have analogous conditions as to time, the cost being further augmented by want of experience in the choice and purchase of material.

Some years ago (before the days of electric motors) a works engineer was appointed to superintend the erection of a gas engine and other machinery, involving the laying of a gas pipe several hundred feet in length.

As might be supposed, the erector was quite equal to making a good job of this piping, but the work proceeded so slowly that eventually a firm, whose men were accustomed to gas-fitting, was called in to complete the connections. The difference in speed was astonishing, and, in spite of the profit earned by the sub-contractors, the piping was far more cheaply laid than would have been possible if the work had been done by any ordinary erector.

The electrical contractor is continually installing dynamos, motors, switches, &c., in competition with rival concerns, and his staff and workmen, in addition to becoming very expert in their particular duties, are accustomed to work at high pressure with a view to making a profit on the jobs undertaken. Further, the staff know exactly what material and apparatus will best suit the requirements, and where such goods may be purchased at the lowest prices.

The factory engineer has none of these advantages. The results of his efforts as regards quality may be as perfect as those produced by employing a contractor, but in spite of the latter's profit, the work cannot be done so cheaply. The engineer himself will probably have to refresh his electrical knowledge by recourse to pocket books and other authorities, the lay-out of the plant being a laborious process. Then, again, workmen and assistants will have to be specially engaged for the job, involving slow progress by the former and high salaries for the latter. The incentive to push on with the work, provided by competition, is also absent,

and in the end the estimates are almost always greatly exceeded.

Stated briefly, the principles of specialisation and standardisation apply as truly to contracting as to manufacturing work, and the contractor who cannot lay down electrical equipment for less money than it would cost his customers to do the work themselves, is bound to go to the wall in the long run.

The Problem of the Small Consumer.

The recent articles in this Journal, by Mr. John D. Mackenzie, touch on a subject of vital importance to the electrical supply industry. The small consumer was regarded in the early years of the industry with a certain amount of indifference, if not contempt. Afterwards, when the rate of increase of consumers began to dwindle, the small consumer was considered as desirable, but an awkward customer to deal with. With the advent of metallic-filament lamps, this individual is looked on in some quarters as now apparently unattainable, as it would not pay to run a service for him. The author of the articles in question endeavours to show that, so far from this being the case, the small consumer can provide quite a handsome revenue under certain conditions of supply, if only we can be persuaded to get out of the groove of preconceived notions on the subject. Mr. Mackenzie's suggestion, which he admits is not very novel except in regard to the figures he puts forward to prove his case, is shortly: 200 volts alternating, one auto-transformer reducing to 25 volts for every few small consumers, flexible surface wiring in the tenements, and metallic-filament lamps.

Incidentally, he does not discuss the system of charging to be adopted; and, unfortunately for his scheme, he ignores the fact that there are many more D.C. stations than A.C. stations, and the former are apparently unable to share in the benefits foreshadowed. There is no doubt, however, that A.C. undertakings would find such a scheme exceedingly advantageous, especially if leave could be obtained to run a secure system of bare conductors overhead. Such a system of distribution could easily be employed in country districts and small towns, and considerable economy would be effected thereby. The charge could be by meter per block of tenements, leaving it to the landlord to make a fixed maximum charge per lamp installed; or the undertaking could charge the consumer direct at so much per lamp per annum.

The D.C. question presents difficulties, which could be overcome in two ways. The more expensive one would be to have a special battery of motor-alternators at the station for supplying alternating current through special overhead mains to tenements and blocks of flats, as aforementioned. The second system would be to have an "auto-battery" of accumulators for every few consumers, but this might not be practicable owing to the questions of inspection, maintenance and depreciation.

There is another point of view which should also be considered by those who are thinking of nothing but 25-volt lamp installations and devices at the present moment. Is it not possible that such systems are only a passing phase? That high-voltage metallic-filament lamps of low candle-power will be produced in the near future? Or that a new kind of metallic-filament lamp will be put on the market of such high efficiency and mechanical strength compared with existing types, that the necessity for small units of light for reasons of economy will disappear, and an era of a higher standard of illumination will begin? It is idle to deny that we have heard rumours of a new lamp of many virtues. The sooner, therefore, that station engineers are ready with a practical scheme to capture the small consumer, the better for their revenues.

Inquiry or Inquisition?

It requires no great stretch of memory to recall the days when commercial methods were regarded as outside the scope of the average municipal electrical undertaking. The necessity for a combination of technical and commercial ability in the responsible heads of such concerns was rarely considered.

Time, however, brings many changes, and not the least satisfactory innovation in electricity supply is the business-like energy and commercial push with which many engineers are forcing the advantages of electricity to the front. But large developments usually mean heavy expenditure, and herein lies the difficulty, for a municipality—especially during the last year or two—must render a strictly accurate account of its financial doings, and, moreover, these latter, although dictated by commercial considerations, are expected to conform with cast-iron-like rigidity to the terms of borrowing.

An excess of expenditure in one direction, or a diversion of capital from one object towards another of a more necessary character, although possibly justifiable in its way, inevitably leads to an acrimonious discussion with the powers that be, when further borrowing powers are sought. Just such a situation arose at West Ham on the 20th inst., when Mr. H. R. Hooper, the Local Government Board Inspector, made a determined effort to grasp the somewhat involved finances of the Council's electricity supply undertaking.

Mr. Elvy Robb, who appeared on behalf of the India-Rubber, Gutta-Percha, and Telegraph Works Co., large ratepayers in the borough, urged that the Council should be made to disclose the terms of each contract made with its large consumers, on the ground that the bulk of the capital expenditure was being incurred with the object of supplying those consumers at unremunerative prices. This course the West Ham representatives naturally objected to, and in the result the Inspector adjourned the inquiry *sine die*. We cannot help thinking that this regrettable state of affairs is largely due to the inquisitorial character of the procedure, for it can hardly serve any useful purpose to disclose publicly (as opposed to privately) the terms of contracts arranged between the Electricity Committee (which, of course, represents the ratepaying public) and private firms; indeed, we fail to see why commercial privacy should not be respected in all cases, whether of municipal or private trading. We can quite understand, and heartily support the efforts of the Local Government Board to direct the expenditure of the ratepayers' money to legitimate objects, but if the development of electricity supply on commercial lines is not included among these objects—if we are to go back to the position of 10 years ago—a clear understanding of the matter at once will save much trouble in the future.

If the loan is likely to benefit the community at large, well and good; if it is required for the purpose of erecting fresh machinery to supply to a few large consumers electricity in bulk at an unremunerative rate—and on this point the inquiry produced no evidence, although it was insinuated that such was the case—it is not business, but we have little doubt that Mr. Hooper, who seems to have been treated with scant courtesy and some want of tact, will gain his point, and see to it that the ratepayers are adequately protected.

"G.B."

As the majority of our readers now know, the London County Council's initial attempt to install and work the G.B. surface-contact system on its tramways from Aldgate to Bow has ended in failure, and no wonder. One may read between the lines of the circular letter issued by the "G.B." Co. to the members of the Council, such ample evidence of official tinkering with constructive details, such total disregard of the requirements and suggestions of the company, that it requires a considerable effort of imagination in order to realise that this so-called "experiment" was ever intended to succeed.

Indeed, in view of the fact that the Committee has already recommended that the ill-fated studs should be superseded by the overhead trolley, which system it was originally desirous of installing on this very route, and only discarded on account of the strenuous opposition of the local authorities, there seems good ground for assuming that the life of the "G.B." studs was intended to be a short, if not a merry, one.

It is no good hiding the fact that the County Council are in a hole, so to speak, for they, in common with every thinking person, must realise that the expensive conduit construction cannot be extended indefinitely, even in London. Whether they were making a *bonâ fide* search for a subtitute, can best be gauged from the company's circular letter to the Council, which shows, among other things, that the Council proposed that the company should grant a licence, to which course it agreed, quoting a sum per mile for patent royalties and technical advice during construction. The Council replied that such technical advice was not required, as their technical staff was fully competent to design and superintend the laying of the system, and the company then agreed to accept a considerably lower sum per mile for royalty. The terms of the licence granted to the Council expressly reserved the company's right to reject all material and workmanship to which the company could take reasonable objection. Such reasonable objection has been repeatedly made by it in writing to the Council's officials, and so seriously did the company regard the deviations that on May 30th, 1908, the company wrote, through its solicitors, to the Council, that it strongly objected to the Board of Trade inspection being held until the company's requirements had been complied with. This warning was disregarded. The company now emphatically affirms that there is no condition prevailing in the Bow Road which militates against the perfectly satisfactory and safe working of the system, provided that the equipment both in the road and on the cars is properly made and fixed.

Such a conclusion is certainly justified by the very successful results obtained with the system at Lincoln since November, 1905; these results form too great a contrast with those obtained in the Bow Road for us to accept mud and traffic as plausible reasons for failure.

As a last resource the company has offered, at its own expense, to rectify the constructive errors of the Council. At the end of 12 months, if the Council are satisfied, they must repay the money expended, not exceeding £2,500. If the Council are genuinely in want of a cheaper system than the conduit, but possessing its æsthetic features, they must, in all fairness, give the company its chance.

In doing so they would, no doubt, be influenced by the attitude of the Stepney authorities, who have swiftly arrived at the conclusion that they are unable to give the consent required to the overhead system of electric traction.

A VISIT TO SOME GERMAN GAS ENGINE INSTALLATIONS.

[BY OUR SPECIAL CORRESPONDENT.]

During the past six months an increasing interest has been taken by engineers in the possibilities of the large gas engine. It was one of the topics that received a good deal of attention at the last meeting of the Municipal Electrical Association in Nottingham; and is one that is frequently referred to in recent papers dealing with power-station practice. Undoubtedly the large gas engine has been developed to a greater extent in Germany than in any other country at the present moment, so that when Mr. Leonard Andrews, of the Key Engineering Co., issued an invitation to view some of the more prominent German installations, the opportunity was gladly utilised by a number of engineers and others who were interested in this type of prime mover. The party, whose names have already been given, left London on July 13th, and separated on July 18th, when the major portion returned to London direct, while others, who had made arrangements to visit further works and factories, remained for a few days longer. On going out they were joined at Metz by Mr. E. G. Sehmer, principal of the firm of Messrs. Ehrhardt & Sehmer, the leading German gas-engine builders, and Messrs. F. Bartholomew and W. W. Hollings, his assistants. Dr. R. Drawe, who is responsible for the design of Messrs. Ehrhardt & Sehmer's gas engines, joined the visitors at Müllheim. The number of visitors would have been larger but for the fact that the invitations were issued at too short a notice for several engineers to be able to make arrangements to get away, and the date, coming as it did just before the holidays, also made it more difficult for some to leave England.

Among the installations visited were those at the Heinitz Government Mines, Homécourt Iron and Steel Works and Messrs. Ehrhardt & Sehmer's works at Saarbrucken, an account of which appeared in the Electrical Review last October, at the beginning of which month Mr. Andrews conducted another party to these places. In addition, this time the party visited the engineering works of Messrs. Thyssen and the gas-engine installation at the huge Brückhausen iron and steel works belonging to the same concern.

After leaving London and spending the night at Brussels, the party arrived at Metz on the following day in time for lunch. At the conclusion of lunch, motor cars, kindly provided by Messrs. Ehrhardt & Sehmer, conveyed the visitors to the Heinitz Government Collieries, some 65 miles from Metz. The route was through pretty country, the roadsides of which were dotted with many memorials to the soldiers who fell on the field of battle in the memorable campaign of 1870, in which Metz was such an important centre of operations.

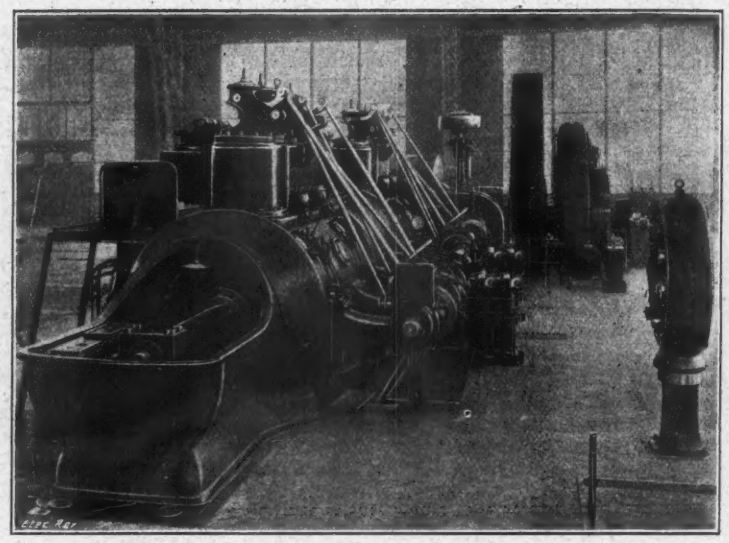
The Heinitz plant is an excellent example of the satisfactory operation of gas engines, as is clearly indicated by the dates of the repeat orders, the first engine being dated 1903 and the last 1907, the others being intermediate. Foundations were being prepared for two 3,000-B.H.P. twin tandem engines, the present installation consisting of four 1,200-B.H.P. twin tandem sets and one 600-B.H.P. tandem set, driven by coke oven gas. The generators are of the Lahmeyer type, three-phase, 50-cycle, 5,300 volts, and it is specially noteworthy that the parallel operation of all the units is obtained without difficulty. The load factor is high, being about 60 per cent.; the nature of the load is that of ordinary colliery conditions, comprising the driving of pumps, ventilating fans, &c., in a number of pits in the neighbourhood. It is anticipated that electric winding plants will shortly be put down. Power is also sold for lighting and traction in the nearby towns of Neunkirchen and Saarbrücken. The general impression of the visitor is that the plant is a sound mechanical one, though the engines, being twin tandem, take up a good deal of space and the stroke appears to be a little short, being only 750 mm., with cylinders 640 mm. in diameter, and a speed of 150 R.P.M. This, however, was stipulated for by the purchasers. Comparatively little noise was made by the plant, which was all the more creditable to the engine builders

when it was discovered that the engines had been running without skilled supervision until the appointment of a resident engineer last month; the former staff comprising a switchboard attendant, a driver and a couple of greasers, who apparently had so much time on their hands, that on one occasion when a visitor arrived at the power house, they were discovered to be all engaged in washing the floor.

On returning to Saarbrücken in the evening, the party was sumptuously entertained to dinner by Messrs. Ehrhardt and Sehmer at the Rheinischer Hof. After dinner the usual toasts were proposed; Sir John Turney expressing the thanks of the guests to Mr. E. G. Sehmer, who presided.

Wednesday, July 15th, was a day of motor-car riding, some 130 miles being covered. Before starting, a visit was paid to Messrs. Ehrhardt & Sehmer's engineering works, which employ about 900 men. The great number of large gas engines in the course of construction there did a good deal to impress the visitors with the fact that the gas engine is no longer an experimental piece of apparatus, but rather a commercial prime mover, the demand for which is becoming greater than that for steam engines, formerly the staple products of these works. The power for operating the works is obtained from a single-cylinder gas engine driven by producer gas obtained from coke, in a modified pressure-suction producer.

At 11.30 a.m. a start was made in the motor-cars for Homécourt, lunch being partaken of on the way at Metz. On reaching the French frontier, the motor-cars were left and the journey continued on foot to the steelworks, which are about a mile from the frontier. The gas-engine installation, driven by blast-furnace gas, is a very fine one, and very well looked after. It is fully loaded, and there is no stand-by—another example of a works manager's opinion of the reliability of this type of engine—the driving of the whole works, rolling mills included, being dependent on the gas-engine plant, consisting of four 1,500-B.H.P. and two 700-B.H.P. engines. The power house also contained a pair of Oechelhauser engines of small size. The chief engineer of the works stated that the sets worked exceedingly well in parallel. The 50-cycle, three-phase, 525-volt generators of 1,300 K.V.A. capacity were built by the French Westinghouse Co.



Thyssen 2,000-H.P. Gas Engine, Showing the Valve Gear, and Instrument Pillar on the Right.

There being no speed limit for motor-cars in Germany (except through towns and villages), the party returned to Saarbrucken in record time, somewhat to the alarm of a few of the passengers; one kilometre was timed downhill at the rate of 60 miles per hour, while speeds of 40 to 47 miles per hour were maintained over long stretches. Some members, anticipating this speed work, returned by train.

Thursday, July 16th, was a day of relaxation from the tiring work of visiting gas-engine installations, train being taken to Bingerbruck, where the travellers embarked on a private launch, and steamed down that most beautiful part of the Rhine between Bingen and Coblentz. Lunch was served on board. A short stay was made in Coblentz, and then a departure was made for Dusseldorf, where the party entertained to dinner Mr. E. G. Sehmer and his assistants, Messrs. Bartholomew and Hollings, who had done so much to add to the general comfort and interest of the visit.

Messrs. Thyssen & Co.'s engineering works at Müllheim were visited on Friday morning, the 17th. These form a splendidly equipped modern engineering establishment, employing about 1,500 men. This firm has combined with Messrs. Ehrhardt & Sehmer in the manufacture of gas engines, and between them the two concerns are probably building more large gas engines than the rest of their German competitors. The Thyssen engine is very similar to the Ehrhardt & Sehmer engine, though the details differ in many respects; for instance, instead of two cams and two eccentrics to work the six valves on each cylinder, six eccentrics are employed. Many of these details will, however, soon be modified, as Dr. Drawe is re-designing many features so as to make the Thyssen engines conform more nearly with those he designed for Messrs. Ehrhardt and Sehmer, the latter make of engine having proved more successful under ordinary working conditions.

Perhaps the most striking features of Messrs. Thyssen's large and well arranged erecting shops, were the electric travelling cranes, which were provided with jib lifting gear, so that a crane in one bay could handle work in another bay, or assist another travelling crane to lift extra heavy weights in the same bay. The inability to lift weights both at the side and underneath the track of a travelling crane, or to transfer a load to another parallel bay, has always been one of the drawbacks of these useful lifting devices. Group driving is adopted for the machine tools; the main shafting for each group is run under the flooring, thus keeping the belting out of the way of the travelling cranes. A very ingenious machine is installed for charging the cupolas in the cast house. A number of travelling buckets are provided, each suspended from a carriage equipped with an electric motor and a bow collector; this carriage runs on a single girder rail above which a live trolley wire is supported. The cycle of operations is as follows: The empty bucket is propelled along the rail until it comes opposite a pig iron bin, where it stops while being loaded by hand with a certain weight of iron, which is indicated by a weighing scale forming a part of the bucket; the bucket then travels to the coke and limestone bins respectively, tripping switches as it passes, and causing the buckets ahead to stop or start travelling as needed. The charged bucket eventually arrives at a vertical lift, which it ascends, travels along a horizontal runway to the charging door of the cupola, discharges its load, returns to the lift, goes down and passes in front of the various bins for a fresh charge of material. This device does away with at least five men, and ensures the work being done with better regularity and greater convenience. In the foundry a number of pneumatic hand rammers were seen at work.

As at Messrs. Ehrhardt & Sehmer's works, a large number of gas engines were in course of construction, especially noteworthy among which were four 3,600-B.H.P. engines. The illumination of the shops was carried out by means of flame arc lamps, placed under the tracks of the travelling cranes. These lamps, in the majority of instances, were not provided with globes, and were at such a height that globes were not required to diffuse the light. Order and organisation to a high degree were the keynotes of the impression made upon the visitors.

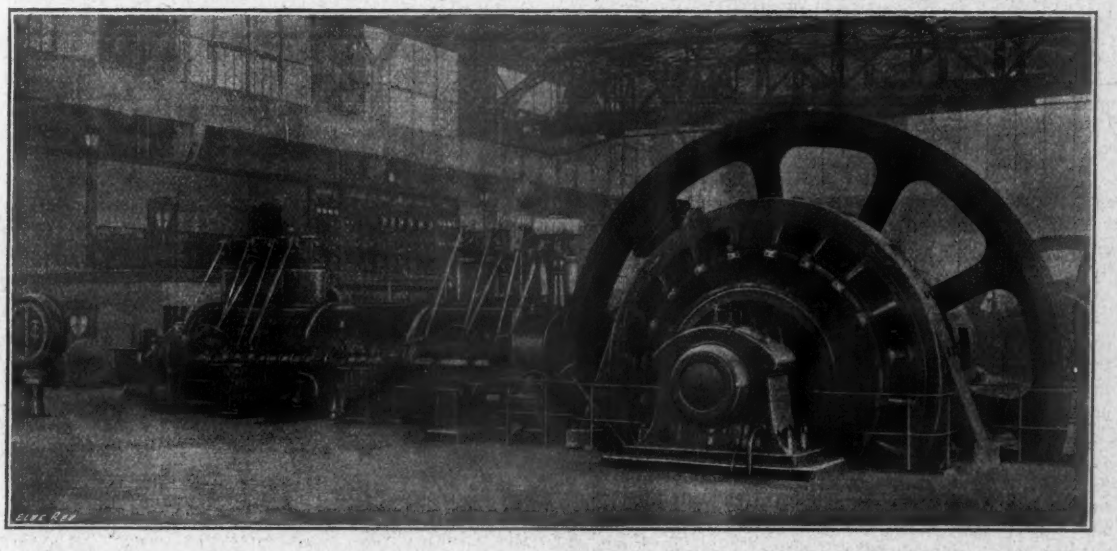
In the afternoon the party proceeded to the large iron and steel works at Brückhausen belonging to the same company. This works, which employs 20,000 men, is only one of a

number controlled by them. Mr. Thyssen, the founder of the firm, is a man of untold wealth, who only commenced business 38 years ago with a capital of £3,000. One of his sons entertained the party to an excellent dinner after their visit to the works.

If any doubt had been left in the minds of some of the party as to the practicability of large gas engines, the sight of the Brückhausen installation would have removed it. An engine house 72 metres wide by 80 metres in length, containing 12 gas engines of over 2,000 B.H.P. each, and foundations being made ready for two further 3,600-B.H.P. engines, is an impressive sight. Six of the engines were driving Siemens-Schuckert three-phase 50-cycle 5,500-volt alternators, two of these engines being of 2,600 B.H.P.; the other six engines were driving blowers for the blast furnaces, two of these engines were of 2,300 B.H.P. It was interesting to note that the speed of the blowing engines could be varied from 30 to 100 revolutions per minute, thus indicating what a flexible machine the large gas engine is. All the engines were driven by blast-furnace gas of about 900 calories per cubic metre. Messrs. Thyssen were the builders of all the engines except one, which was of the Nürnberg type. An experiment had been tried of using a liner in one of the Thyssen engines; this liner had become loose after nearly 12 months' working, so the engine was dismantled at the time of the visit, in order that the liner might be re-fixed. This afforded an excellent opportunity for seeing the results of wear and tear on the various working parts. It is greatly to the credit of the engine builders that the parts were in practically as good condition as when the engine started. There was no scoring on the piston-rods; it was impossible to feel any ridge whatever at the points where the rods left the stuffing-boxes, either at the tail or the piston ends. To use the literal German expression, the rods were "looking-glass bright." Similar good condition was the prevailing feature of the other working parts, with the exception of the sparking plugs, which were worn and burnt; but this is only to be expected under the conditions of working, and renewal is a very simple matter, costing but a couple of shillings.

On returning to Dusseldorf, the party entertained Mr. Leonard Andrews and Mr. R. B. Slacke to a light supper, during the course of which Sir John Turney made a presentation to each, on behalf of the party, as a souvenir of the trip and as a mark of their appreciation of the untiring efforts of these gentlemen to make the visit so pleasurable and instructive.

Some members of the party, before commencing this visit, had an idea that large gas engines could be got to work, but they thought that these engines were still in rather an early stage of development, very often needing repairs, and that they would be noisy, clattering, vibrating machines, accompanied by the sound of violent explosions, splashing of oil, and escaping exhaust gases. Instead of this, they saw clean, quiet, smooth-running engines that could easily be mistaken for large horizontal, slow-speed, automatic cut-off, Sulzer trip-valve type steam engines. There was every evidence of reliable working 24 hours a day regularly throughout the year, with the exception of a stop for a couple of hours once a fortnight in the well-cared-for plants, to clean the sparking plugs and to make other slight adjustments that would tend to keep the running of the engine up to standard. That the large gas engine is rapidly leaving its experimental period behind, is indicated by the fact that there is now an aggregate of over 500,000 B.H.P. in engines of over 700 B.H.P. actually at work or on order in German ironworks and collieries alone, and that the majority of these gas engines are working continuously without any marked allowance for reserve. Reliability is of course of as much importance in Germany as it is here. When passing ironworks in the train, we noticed in works after works, the light white vapour caused by the water injected into the gas engine exhaust, showing how widely these engines are being adopted. While blast furnace and coke oven gases have been largely used for engine driving, producer gas is not employed to any great extent in Germany, English experience in this respect being evidently much greater.



Thyssen 2,000-h.p. Gas Engine and Generator, Running on Blast Furnace Gas.

CORRESPONDENCE.

Letters received by us after 5 P.M. on Tuesday cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Live Steam Feed-Water Heating.

I have no doubt that there are other engineers besides the writer, who have been awaiting some reply from the makers of live steam feed-water heating apparatus to the sweeping condemnation of their goods contained in the two articles from Mr. Jonel, recently published in your journal, who not only gives in the most candid language his opinion of such apparatus, but also backs it up with the results of tests.

In the first article he deals with the question of the softening effect of this method of treating the water, and shows clearly that any claim in this direction has certainly not been borne out by his experience. One of several cases quoted is that of the boiler of a Thames tug fitted with an internal heater, which was choked up in a week, and the boiler nearly burst by its use, after which it was thrown overboard. On the question of increased running efficiency from the high temperature feed-water, he is equally

severe, and condemns all claims in this direction as "mere bluff," and winds up by stating that the whole thing is one of the "choicest and most flagrant misstatements that for some time have been presented to steam users."

On referring to the advertisements dealing with one type of such apparatus, one finds no definite claim of increased efficiency, but one to the effect that 40 per cent. of the orders this year have been repeat orders, and one can only conclude that if these users have tried the apparatus and are content to order more of them there must be an answer to Mr. Jonel; as the writer is one of those anxious to have absolutely reliable information on this point, he trusts that the patentees or others interested in the apparatus will come forward with a full and complete reply, failing which he is content to take Mr. Jonel's authoritative views on the subject, treat the whole thing as bluff, and leave such apparatus severely alone.

Veritas.

Worcester Steam and Water-Power Plant.

In reply to the contribution from "E. E. H." in your issue of July 10th, 1908, I would thank your contributor for his kind references to the difficulties which have been experienced in carrying out the reconstruction of the Worcester scheme; I only regret that it was difficult in the short time I had to make the paper of a more contentious character.

His remarks regarding the small single-phase motor are quite in accordance with my experiences that such motors are best left alone if an electricity supply is to succeed. The motor in question was replaced by a continuous-current machine, with the result that the consumer's account was reduced by nearly 30 per cent.

The distribution question touched upon is not so serious as "E. E. H." suggests. One large consumer, namely, the sewerage works, contributed half the cost of a special feeder, the remaining half being paid out of revenue before a unit was supplied.

This extension was one mile in length and cost £1,240, or £620 to each department. Another large consumer, namely, the Royal Porcelain Works, is supplied by an extension from the original traction feeders, which are of ample dimensions; the load factors of these two consumers should work out at approximately 60 per cent. and 35 per cent. respectively, with the further advantage that both are restricted-hour loads.

With regard to special mains for supplying power to the district referred to by "E. E. H.," a general scheme for supplying the whole of the power users was drawn up on broad lines; portions of the scheme were from time to time carried out in such a manner, and the revenue resulting from such extensions has usually amounted to quite 60 per cent. of the cost at the end of the first year.

C. M. Shaw.

Worcester Electricity Works,
July 22nd, 1908.

Electric Power Supply in Lancashire.

At the meeting of the Lancashire Power Construction Co., Ltd., a few days ago the chairman, Mr. T. Callender, gave a summary of the history of the Lancashire Power Co., which, as a work of Art (with a capital A) is most interesting, but which, as a guide to accurate knowledge, leaves a good deal to be desired.

Of course, we can all sympathise with the chairman anxious to make the best of a bad job, but as the publication in your columns gives a wide circulation to these statements, it may be as well to discuss them a little, and to give a plain unvarnished summary of facts.

Probably the management of the Lancashire Power Co. by its various boards sitting in London and not in the least in touch with Lancashire, has been one of the most brilliant examples on record of "how not to do it."

The company was promoted, in the first instance, without any material support from Lancashire men of influence, and although one or two, such as Sir W. Houldsworth, M.P., gave evidence in its favour they all refrained most religiously from putting money into the concern, and from taking current from its mains when the supply was, so to say, on tap. Desperate efforts were made during the years 1900, 1, 2 and 3, to obtain financial support, but with so little success that no attempt has ever been made to issue a prospectus, and place the shares on the market. This being so, the L.P. Construction Co. was formed to erect the station and lay the mains. At this point the only Lancashire company interested, Messrs. Glover & Co., of Trafford Park, "stood down," and Messrs. Callender came on the scene.

During all these years active negotiations had been going on with local authorities, the writer having been appointed "business manager" for that purpose. It must be borne in mind that the Act of 1900 was obtained to enable the company to supply "in bulk" to local authorities, and to local authorities and in bulk only, unless, of course, the local authorities agreed to hand over their powers to the company for "a consideration."

During the years of weary waiting at least 20 local authorities were brought to be *most favourably* disposed towards the company, and awaited the supply of current most impatiently. In fact, at least three got tired of waiting and either went to an adjoining borough for a supply or erected their own station. Nearly all the towns and villages mentioned in the directors' report were included in the above category, and in addition such important townships as Gorton, Failsworth, Chadderton, Rawtenstall, Haslingden, Bacup, Shaw, Royton, and Milnrow, with great and various industries and large populations. Mr. Callender tells us that "when they erected their station and laid their mains, and were in a position to supply, they found that the position which they held was misunderstood by many of the local authorities, and that instead of being looked upon as a useful member of society in Lancashire, they were considered as a bitter enemy by most of the local authorities." But why? Something had happened. Of the four centres of supply scheduled in the Act, it was decided to erect one station, that at Great Lever, to afford energy through its mains to the Bury district, and on to the Rossendale Valley, with its flourishing townships of Rawtenstall, Bacup and Haslingden, with whom draft agreements to supply current in bulk had been drawn up, which the Town Councils were prepared to "sign, seal and deliver." But, with the coming of the head engineer (not the present one), a new proposition was brought along. The local authorities were asked to hand over their large consumers, such as the quarries overlooking the Rossendale Valley, to the company, to be supplied "direct from the mains." No doubt a good engineering device, but seeing that the authorities had been told that we were absolutely only supplying in bulk, and had so assured their more or less Socialistic constituents (who looked with a jealous eye on any more companies coming in to exploit them), this was a bombshell in the camp. Not content with this, the company drafted a Bill to give them powers to supply in bulk over the heads of the local authorities. Now, indeed, to quote Mr. Callender, "they were considered as a bitter enemy by the local authorities." A meeting was called at the Manchester Town Hall at which some 60 local authorities were represented, strenuous opposition was offered to the Bill, and the Labour members promised to throw it out on the second reading. "Here's a how d'ye do!" Needless to say the clause was dropped "like a hot potato," and nothing more was heard of the Bill, though, emasculated, it may have become an Act. But the mischief was done. The Rawtenstall Valley was lost, and all the little places mentioned in the report were only obtained by taking over, and paying for, their little white elephants of Provisional Orders!

The next fatuous thing was to strike out from the line of mains all the townships directly connected with the great staple industry, cotton spinning, on the plea that electrical power could not compete with steam. This deleted at once Shaw, Royton, Crompton, Chadderton, Milnrow, Failsworth and Gorton, the very heart and centre of the great mill-building boom of the last three years.

One of my last experiences was to receive a letter from the Gorton U.D.C. clerk asking me to attend a meeting to discuss and, if possible, settle terms of supply. I sorrowfully had to reply that my directors had decided not to enter the township.

Then, when too late, a feverish activity was shown to obtain mill work, and the Acme Mill, Pendleton, was offered, and accepted, terms per unit which have entailed serious loss from the beginning, as, I make bold to say, was known to be inevitable. Mills to the number of about ten have adopted the electric drive, but have installed their own plant.

It would be exceedingly interesting to know the terms which have been offered to the Acme Mill, which "the owners had expressed their willingness to accept," and "which would result in a small profit." Will the "owners" give ·5d. per unit, and can the company make a *bona fide* profit for less?

Looking a little into the position as to the districts Mr. Callender is so proud to put forward, let us consider Tottington. The provisional order of this little township has been held for a year or two. Is there a single customer? Abram is a little colliery village in which there is not a demand for 50 KW. unless a colliery demands a supply. In that case it will have to be supplied at ·3d. per unit at a distance of 12 miles from the generating station at Outwood.

Sir, it is all very well for Mr. Callender to say, in an airy manner, "two good years were wasted"; it is, perhaps, as well that the public and the shareholders should know how, and by whom.

W. John Herring.

Manchester, *July 27th*, 1908.

Rail Corrugation.

I have been much amused by reading the various theories put forward by experts as to the cause of rail corrugation on electric tramways. Nearly every tramway manager and engineer has a theory of his own, but no remedy, so much so that it reminds me of a story from the west of Ireland, where the Society of Antiquarians visited a certain part of Galway and came across an old building. Half the members said it dated back to the seventh century, whilst the other members gave it as their opinion that it dated from the eleventh century only. The members not being able to agree, they finally decided to appeal to an old resident. His reply was, "Well, gentlemen, it was built about six months ago by my neighbour, Mr. Doolin, as a stable for his donkey."

E. Cloney.

London, S.W., *July 21st*, 1908.

Electrical League.

I have the pleasure to advise you that the undermentioned have constituted themselves a Provisional Committee (with myself as Honorary Secretary) in order to co-operate with yourselves and others in the formation of an Electrical League to discuss commercial and legislative questions affecting the industry, with a view to finding solutions of the present difficulties:—A. K. Baylor; Lieut.-Col. H. R. Beddoes; A. N. Connett; B. M. Drake; E. Garcke; H. Hirst; M. B. Mountain; S. Rentell; Mark Robinson; A. A. C. Swinton; A. G. Whyte.

In view of the fact that I have received from a number of other gentlemen letters expressing sympathy with the movement, though not definitely expressing willingness to join the Committee, it may be found advisable to enlarge the number of this Provisional Committee.

The first essential to the success of the proposed League is that the isolation of the different sections of the industry should be overcome, and it is proposed to extend the invitation to join the League to everyone who is in any way interested in electricity, whether a shareholder, consulting engineer, town councillor, municipal station engineer, manufacturer, contractor or trader, whether employer or employé. The suggestion is that the League should be an effective combination of individuals rather than of corporations, companies or firms, and every endeavour will be made to work in co-operation with all established electrical societies.

The Provisional Committee will, in the first instance, confine itself to seconding any efforts that may be made to induce someone who enjoys the confidence of all sections of the industry to bring together the representative men in the industry for a general discussion of the position.

R. Borlase Matthews, Wh.Ex., A.M.I.C.E.

London, S.W., *July 27th*, 1908.

[It will be seen that there is a considerable family resemblance between the scheme outlined by our correspondent and a movement which was set on foot last year—the proposed "Union of Electrical Interests"—regarding which a premature announcement was published in the *Times*, and commented upon in our issue of October 4th. The objects of the League (or Union), like its constitution, are somewhat nebulous; it seems to resemble a debating society more than anything else. The last paragraph in particular is cryptic in the extreme. Who is going to make the efforts that are only to be *seconded* by the Provisional Committee? Who is the fortunate person that enjoys the confidence of all sections of the industry, and is to be induced by the unknown prime mover to bring together, &c.? Passing by the delicate question who are the representative men in the industry, what is the position that is to be discussed? As we said on the previous occasion (Vol. 61, p. 554), we shall be glad to place before our readers particulars of "any well-considered plan with definite objects," characters which appear still to be lacking in the scheme before us.—Eds. E.R.]

New Patents Act.

There have been endless discussions about this Act, as well as numerous articles in the trade journals and daily papers. But there is one aspect of it which strikes me as most important, and which I have not seen touched upon anywhere, which is, the entire absence of equity in applying the new Act to patents taken out at any time *before* the passing of the Act.

A patent, I take it, is a contract by which one party undertakes to disclose particulars of an invention, and the other party—the Government—undertakes, on payment of certain fees, to protect the first party, for a limited number of years, in the sole rights of the invention so disclosed.

Now, any contract is binding on the parties to it, until it expires under its own provisors, or until its conditions are varied *by consent of both parties*. Surely this is sound common-sense. The fact that one party to the contract is the Government, makes no difference. In equity, *both* parties to a contract are surely equally bound by the conditions agreed upon.

Consequently, the proposition embodied in the new Act, viz., that, unless a patentee starts and carries on in this country the manufacture of the article patented, the Government will, or may, cancel the patent rights granted, *is utterly against all sense of equity* so far as patents are concerned which were granted *before* the passing of the new Act.

I feel the unequity of this so strongly that, if I were holding a patent under the previous Acts (which I do not), I would with the utmost unconcern take my case into the courts, if it were attempted to cancel the patent as above—and I do feel quite certain that the courts would decide that, although no individual can override the new law, still, neither can the new law, in equity, override a previous contract, and that the Government *is bound to compensate the patentee whose patent rights it is taking away through no fault of his.*

To my mind, the only proper way of wording the Act would have been to say that from the *passing of this Act every new patent* shall be subject to the conditions as to working in this country. This would have left a transition period for patents under the old Act to expire in due course. But to enforce a new condition on old patentees is simply unfair. It is much the same thing as if you were to agree to take a building at a certain rental for 20 years, and after your machinery was erected and the business set going, your landlord was to say:—"No matter what our agreement is, unless you pay in future 50 per cent. more rent, I consider our agreement is at an end." How would you like that?

The point involved concerns home as well as foreign patentees. I would not be surprised if the difficulty should soon turn up in a very practical form, and so far as foreign patentees are concerned, no doubt any really important manufacturer could exercise pressure on his Government to see the patent rights respected over here, for which he has duly paid.

Perhaps you may see fit to comment upon this letter in your paper. I am generally rather disinclined to rush into print, but in this matter, I feel it would be well to raise a discussion. I am enclosing my card herewith.

Non-plussed.

[The Comptroller, we believe, has discretionary powers in the matter, and would probably temper the breeze to the foreign lamb whose term was approaching its limit. It would be interesting to know, in this connection, whether the course suggested by our correspondent was followed by the foreign Governments whose methods our Government has now adopted, when *they* instituted those methods.—Eds. E.R.]

Price of Crude Oil.—A correspondent warns engineers who are thinking of installing oil engines to make sure beforehand as to the price for which they can obtain crude oil for the same before definitely deciding, as at the present rapid rate of rise in the oil market, it will not be long before it will pay to run steam rather than oil engines; on the other hand, suction gas plant might possibly be better than either.

LEGAL.

Damage to a Model.

Before Mr. Justice Pickford and a special jury at Liverpool Assizes last week, an action was brought against the Midland Railway Co. by Mr. Peter Kavanagh, of Liverpool, who sought compensation for damage to a working model of a tramcar for the electrical system, on which he had spent three years' labour and expended in wages and material £150. It embodied three patents and other improvements of his own. On February 13th he took it to Sheffield to demonstrate it before the Tramways Committee there, and while a porter in defendants' employ was wheeling it on a truck, it was so much damaged that plaintiff concluded it would have to be entirely rebuilt. He estimated the value at £500.

The jury awarded plaintiff £80 damages, but as they said there was contributory negligence, judgment was deferred. On Tuesday the Judge gave judgment for the plaintiff.

PARLIAMENTARY.

Keighley Corporation Bill.—The Select Committee of the House of Commons, presided over by Mr. C. N. Nicholson, has passed the preamble of the Keighley Corporation Bill, which gives the Corporation power to supply energy to premises having a separate supply; to supply electrical fittings; and to lay gas or electric mains or pipes in streets or roads not dedicated to public use.

Bills Advanced.—The Great Northern, Piccadilly and Brompton Railway, Keighley Corporation, and the Metropolitan Electric Tramways Bills were read a third time on Monday.

The London County Council (General Powers), Central Ireland Electric Power, London United Tramways, and the Nottinghamshire and Derbyshire Tramways Bills were read a third time on Saturday.

The Telegraph Construction Bill has passed through Committee.

The Bridgend, Llandaff and Dinas Powis, and Llansamlet prov. orders have been confirmed.

The second reading of the London and District Electricity Supply Bill was to be taken yesterday. The Government proposed to instruct the Committee to insert a clause conferring purchasing powers on the L.C.C., and several London Liberal members intended to move the rejection of the Bill.

Dublin United Tramways Co. (1896), Ltd.—The report for the half-year ended June 30th, 1908, presented at the meeting at Dublin on the 28th inst., states that the amount available for division is £41,594, out of which it is recommended that dividends be paid for the half-year at the rate of 6 per cent. per annum on the preference shares, and at the rate of 6 per cent. per annum, free of income-tax, on the ordinary shares, leaving £6,494 to be carried to next account, in addition to £4,749 unexpended out of the sum set aside last half-year for reconstruction and maintenance.

BUSINESS NOTES.

Book Notices.—*Technical Dictionary in Six Languages.* Vol. III. London: A. Constable & Co. 1908. Price 16s. net.—The third volume of this admirable series of dictionaries deals with steam boilers, engines, and turbines, and is almost as bulky as Vol. II, the electrical section. It proves, however, that the paper is thicker, and there are only 1,310 pages as compared with 2,100—nevertheless, it is a remarkable volume upon one subject. The editors met with great difficulties in the collection and translation of many of the terms, as there were frequent examples of words in one language (especially German) which could not be translated directly into other tongues, owing to the lack of synonymous expressions. A lengthy list of collaborators is given, and Messrs. Otto Nerger and W. Wagner receive special thanks for their work as collector of the terms and editor respectively. The contents cover the subjects named very fully, beginning with fuels and the production of heat, and working up through furnaces, evaporation, materials, and boiler construction to the erection and management of boilers, pipes, &c.; the theory of the steam engine and turbine, and the details of parts, erection and working of the machines, are similarly dealt with, in a total of 25 chapters. The little illustrations which are so helpful—indeed, practically indispensable in many cases—are very cleverly drawn so as to convey their meaning most readily and clearly, and the alphabetical index at the end leads one at once to the desired paragraph. The volume, like its forerunners, is a most welcome addition to the engineer's book-shelves, and will in time, we believe, be regarded as indispensable.

Holidays in Belgium.—The Great Eastern Railway Co. has sent us a copy of a little book by Percy Lindley, describing Belgium and the Ardennes from the holiday point of view. It is prettily illustrated, and gives particulars of places to visit and how to get there. It is to be had from the publishers, 30, Fleet Street, E.C.

Electricity for Lighting, Heating and Power.—The electricity department of the Borough of Woolwich has issued a very neat and attractive pamphlet setting forth the advantages derived from the use of electricity for the purposes mentioned in the title. Numerous half-tone illustrations are given, showing various applications, including metallic-filament lamps, flame arcs, motor-driven machines, heating apparatus, &c., and much interesting information, calculated to arouse the interest of the prospective consumer.

"Laboratory and Factory Tests in Electrical Engineering." By G. F. Sever and T. Townsend. London: A. Constable & Co. 1908. Price 10s. 6d. net.

"Year Book," List of Graduates, and Views, of the Michigan College of Mines. Houghton, Michigan. From the College.

"Regulations for Technical Schools, &c., in England and Wales," 1908-9. London: Eyre & Spottiswoode. Price 2d.

"Colonial Preference and Imperial Reciprocity." London: The Tariff Commission.

"The Potential of Partially Insulated Systems in Relation to the Potential of Earth." By M. B. Field. Original Communication to the I.E.E.; reprint from *Proceedings*, 1908, part 190, Vol. 41.

Amerian Institute of Architects, Quarterly Bulletin; April, 1908. Washington: The Institute.

Catalogues, Lists, &c.—The Foster Arc Lamp and Engineering Co., Ltd., Worple Road, Wimbledon.—Price list of their patent transformers for use with metallic-filament lamps, listing some 300 patterns for 10 different frequencies, and a wide range of pressures and currents.

The Hart Accumulator Co., Ltd., Stratford, E.—Price list of special batteries for use with 25-volt high-efficiency metallic-filament lamps, consisting of 13 cells each, of capacities from 8 × 10 to 960 × 10 ampere-hours. Also price lists of ignition batteries for motor-cars and boats, cyles, &c.; and cell-testing voltmeters of a special pattern, reading to tenths. with centre zero.

Messrs. Vaughan & Son, Ltd., Royal Ironworks, West Gorton, Manchester.—Catalogue of overhead travelling cranes, showing work in progress in their shops, and giving illustrations of important installations which they have carried out, with useful notes on practical points in connection with electric cranes. The catalogue includes hand-power cranes, pulley blocks, runways, capstans, &c., and is very well illustrated. Some of the cranes shown are fitted with A.C. equipment.

Messrs. R. Wolf, 7, Laurence Pountney Hill, E.C.—Catalogue of their patent superheated Locomobiles (portable and semi-portable engines), which are made up to 600 B.H.P. The special feature of these power generators is their removable fire-box and tubes, which can be taken out, together with the superheater, for cleaning. An extended furnace attached to the boiler front, and lined with fire-brick, is also a noteworthy feature. The catalogue is very finely illustrated, and gives full particulars regarding the construction and working of the Locomobile, for which a test result of 1·04 lb. coal per B.H.P.-hour is claimed. The catalogue is accompanied by an illustrated pamphlet, showing installations employing the Locomobile in foreign works of various kinds, including electric generating stations, a purpose for which, it is claimed, the Wolf Locomobile is specially suitable.

Messrs. Marples, Leach & Co., Ltd., Adnil Building, Artillery Lane, E.C.—Leaflet describing their electric motor-driven bell, for D.C. or A.C. up to 220 volts, suitable for mines, foundries, factories, &c. The motor is enclosed, and is fitted with the other working parts under the gong.

Messrs. Peto & Radford, Ltd., 100, Hatton Garden, E.C.—Illustrated catalogue and price list of accumulators for motor cycles and cars in numerous patterns, for ignition and lighting, and cells

of larger capacity for electric lighting and power; also apparatus for charging accumulators from D.C. and A.C. mains, carriage fittings and lamps, the "P. & R." electric communicator, portable battery lamps, Osram lamps, wires, voltmeters, dynamos, and a variety of small accessories.

THE AMPERE ELECTRICAL CO., 6, Fleet Street, Dublin.—Leaflet relating to an "electro-medical" transformer of British make for use where an A.C. supply is available, furnishing current at voltages suitable for surgical, dental and other apparatus, with regulating switch, plug for attachment to lamp-holder, &c.

MESSRS. LUDW. LOEWE & CO., LTD., Farringdon Road, E.C.—Appendix to "Pamphlet E," on cylindrical grinding, giving examples of work done on the Norton grinder.

Trade Announcements.—MESSRS. PARMITER HOPE and SUGDEN, 50, Ellesmere Street, Hulme, Manchester, announce that their works will be closed for the annual holidays from noon on Saturday, August 8th, to 9 a.m. on Monday, August 17th. A small staff will be in attendance to deal with urgent matters.

MESSRS. CROMPTON & CO., LTD., Salisbury House, E.C., inform us that the Arc Works, Chelmsford, will be closed from noon, Saturday, August 1st, to Monday, August 10th. The head office at Salisbury House will remain open as usual.

MESSRS. VAUGHAN & SON, LTD., Royal Iron Works, West Gorton, announce that their works are closed from Friday last to Tuesday morning, August 4th.

MR. HARRY W. TURNER, who, as consulting engineer, has for the last two years been occupied in advising firms in matters relating to insulation and winding, will from August 1st be associated exclusively with the Sterling Varnish Co. at Brougham Street, Blackfriars Road, Manchester.

MR. RALPH BALL resigned his position as managing director of the Accessories Manufacturing Co., Ltd., of 9 and 10, Wells Street, Oxford Street, W., with which he is no longer connected in any way, and has taken over the management of Messrs. Julius Sax and Co., Ltd., 90 and 100, Charing Cross Road, W.C.

MESSRS. ALLDAYS & ONIONS CO., LTD., Birmingham, will close their works from August 1st to 8th for their annual stocktaking, and no goods will be received during that period.

THE WILSON-WOLF ENGINEERING CO., LTD., Bradford, will close their works and offices for the annual holiday from Saturday, August 1st, until Monday morning, August 10th.

Bankruptcy Proceedings.—FRANCIS BENJAMIN EGGINGTON, electrical engineer, 11, Tempest Street, Wolverhampton, appeared for public examination in bankruptcy at Wolverhampton County Court on Wednesday last week. The gross liabilities were set down at £103 2s. 2d., and there is a deficiency of £82 0s. 2d. The examination was adjourned for debtor's deficiency account to be amended.

JAMES A. WILSON, electrical engineer, Kilmarnock.—The estates were sequestrated on July 17th; a meeting to elect trustees is to be held to-day. Claims must be lodged by November 17th next.

E. J. MUDDLE, Hove.—Notice is given of the release of the trustee, as from June 18th.

Patents for Sale or Licence.—Patents relating to couplings for electric cables; electrical and heat insulating compositions; drawgear for railway vehicles; storage batteries; electric lighting systems; carbon articles; regulating apparatus and A.C. electrical machinery, are offered. See our advertisement pages.

Outing.—The staff, employés and friends of MESSRS. TILLEY BROS., lighting and heating engineers, of 53, Kingsland Road, N.E., went for their summer outing to Southsea on Saturday last. The invitations numbered nearly 100. An excellent dinner and tea were presided over by Mr. W. H. Tilley, ably supported by Mr. F. Tilley; at dinner, short speeches were delivered and replied to by Messrs. W. H. and F. Tilley, Mr. W. G. Wigley, Mr. A. E. Riley and Mr. S. P. Ives.

Marathon Race.—It is of interest to note, in connection with this historic event, that the signal for the start was conveyed by H.R.H. the Princess of Wales by means of an electrical device. This consisted of an indicating apparatus fixed in a suitable position behind the competitors, which was operated by a special push on the table in front of the Princess. Mr. J. S. Huddleston, of MESSRS. SIEMENS BROS. & CO., LTD., who was one of the stewards, fitted up the apparatus, which was made at the Woolwich works of the above company.

Continuity Grip.—MESSRS. J. ALBERT GEE & CO., of 52, Upper Jackson Street, Hulme, Manchester, are introducing a new "continuity grip" for slip-joint conduit, consisting of a loose collar through which two set screws are tapped. One of the screws makes contact with the outer member of the joint, while the other passes through it and makes contact with the inner member, at the same time effecting a mechanical grip. It is claimed for this grip that it will hold though the conduit be a trifle small; that the points of the screws are hardened, and pierce the enamel; the fittings, couplings, &c., only require a hole drilled through them, which in no way affects the stock for ordinary slip-joint work; small cost, neatness and simplicity. The idea is certainly ingenious, and the sample which we have received seems quite satisfactory.

"Ferrosnake" Draw-in Tapes.—The ARMORDUCT MANUFACTURING CO., LTD., of Farringdon Avenue, E.C., have introduced an excellent device for drawing-in electrical conductors, in the shape of a spiral steel wire, which is extremely flexible in all directions, and cannot be got into a kink or knot or otherwise entangled. This greatly facilitates the process of threading through conduits, and the peculiar nature of the device enables it to be set free should it meet with any obstruction in the conduit or fittings, by twisting its end. To give longitudinal tensile strength, in which respect the spiral alone would be wanting, a steel wire traverses it from end to end, so that it is exceedingly strong and durable. The tape is called the "Ferrosnake," and will, we believe, be heartily welcomed by the wiring fraternity.

Buffer Battery Installation.—We have received from THE D.P. BATTERY CO., LTD., of Bakewell, Derbyshire, a leaflet describing an installation of electric cranes at Southampton, in which the demand for current varies abruptly from 0 to 800 amperes. By means of a "D.P." battery of 245 cells, capable of discharging at 500 amperes for one hour or 1,000 amperes for short periods, in conjunction with a Lancashire Dynamo and Motor Co.'s booster, the variation in the load on the generator is kept down to about 15 amperes from the mean value, so that a dynamo giving 192 amperes at 520 volts, driven by a Westinghouse gas engine, is capable of supplying power to the installation. If the generating plant were shut down altogether the battery could keep the cranes going for over three hours. Charts are given showing the fluctuating character of the line load, presenting a sharp contrast with that of the generator, which is practically uniform.

Dissolutions, Liquidations, &c.—A compulsory winding-up order having been made against the KEVAN ELECTRIC CO., LTD., 88, Charing Cross Road, W.C., the statutory first meetings of the creditors and shareholders were held on Tuesday at the Board of Trade offices, Carey Street, W.C. The statement of affairs shows liabilities £1,886 19s. 7d., against assets valued at £1,451 1s. 9d., and a deficiency of £4,190 2s. 10d. to the shareholders. According to the report of the chairman (Mr. W. J. Warley, Official Receiver), the company, which was registered as "The Robstone Lamp Illuminating Co., Ltd.," on January 28th, 1907, was formed for the purpose of carrying on the business of electrical contractors, and particularly the sale of the "Robstone Lamp" and patent reflectors. On May 16th, 1907, the name of the company was changed to its present title, owing to an injunction being threatened on behalf of the Robertson Lamp Co. to restrain the company from using the word "Robstone." The nominal capital of the company was originally £2,000 in £1 shares, but was increased on April 23rd, 1907, to £10,000 by the creation of 8,000 additional shares of £1 each. By the purchase agreement which was entered into on January 30th, 1907, by Robson, Mitchell-Hedges and Kevan with the company, the vendors sold to the company the sole right to sell the "Robstone" lamp and reflector in the United Kingdom, with the benefit of all contracts and the goodwill. The purchase consideration was fixed at £1,500 payable in fully-paid shares of the company in the following proportions, viz.:—Mitchell-Hedges 700, Robson 500, and Kevan 300. At an extraordinary general meeting of the company held on April 21st, 1908, a resolution was passed for voluntary winding up, and the appointment of Mr. E. Heisch, chartered accountant, of 120, Fenchurch Street, E.C., as voluntary liquidator. The company appears to have traded unsuccessfully; the loss to November 30th, 1907, was ascertained to be £696 2s. 1d., which was increased to £1,368 3s. 9d. by April 21st, 1908, when the company went into voluntary liquidation. The directors, with others, promoted and formed Kevan Signs, Ltd. Substantial sums were advanced to the latter by the company, and practically the whole of the "bad debts" shown in the statement of affairs is represented by the sum of £316 2s. 8d. due by Kevan Signs, Ltd., which company is now in voluntary liquidation. The failure of the company is attributed by Bell, Kevan and Robson to lack of capital.

The Chairman reported that with regard to the sale of the stock, as authorised at a meeting of the principal creditors, the estimate placed on the stock by the directors would not be reached.

A resolution was passed for the Official Receiver to act as liquidator, assisted by the following committee of inspection, viz., Mr. Frank Taussig, representing Messrs. Schiff and Co.; Mr. F. J. Farrow (the Electrical Co.), and Mr. F. J. Tiffin.

THOMAS PARKER, LTD.—At an extraordinary general meeting of the company on the 14th inst., a special resolution passed on June 29th was confirmed, to the effect that the draft agreement for the transfer of the undertaking to the new company be approved, and that the old company be wound up voluntarily, with Mr. W. A. Nelson, of Lich Gate, Wolverhampton, as liquidator.

LINES BROS., Leeds.—Mr. J. F. Mason and Mr. A. A. A. Lines have dissolved partnership; debts will be paid by the former.

CORNWALL ELECTRIC POWER SYNDICATE, LTD.—This syndicate is to be wound up voluntarily with Mr. J. A. Stoneham, of 90, Cheapside, E.C., as liquidator. All claims must be made by August 31st.

ALLAN ELECTRICAL SYNDICATE, LTD.—This company is winding up voluntarily with Mr. H. Garton Ash, of 52, Coleman Street, E.C., as liquidator.

LLANELLY TRAMWAYS CO., LTD.—A meeting to hear an account of the winding up is to be held at 32, Stepney Street, Llanelly, on August 27th next.

CROSS & CROSS, electrical engineers, Pleck Road, Walsall.—The partnership between Mr. F. W. Cross and Mr. A. A. P. D. Stone, trading as above, has been dissolved; Mr. Stone will attend to debts.

DOLTER ELECTRIC TRACTION, LTD.—Notice is given that a meeting of creditors will be held on August 5th at the offices of the liquidator, Mr. W. S. Ogle, to determine whether application shall be made to the Court for the appointment of another liquidator or of a Committee of Inspection.

REEDS ELECTRICAL CO., LTD.—Creditors are required to forward particulars of claims before September 7th to the liquidator, Mr. D. S. Fripp, 90, Cannon Street, E.C.

ILLUMINATED SIGNS, LTD.—Notice is given of the first meeting of creditors on August 7th, at 132, York Road, S.E.

Sale.—The sale of the surplus plant of Messrs. Marconi's Wireless Telegraph Co. has been postponed to August 5th. See our advertisement pages.

LIGHTING and POWER NOTES.

Bisley.—An electric lighting installation has been provided at Bisley Camp for the illumination of the N.R.A. offices. The Woking Electric Supply Co. received instructions to proceed with the contract for installation on June 27th, the supply to be provided by July 8th. Notwithstanding that two miles of cables had to be delivered and laid in 11½ days, the work was completed under the direction of the engineer, Mr. J. G. McLean, in a day less than the specified time, and the light was available on July 7th. In addition to lighting the offices, energy is used to drive a linotype machine and a cinematograph.

Beckenham.—The Council, on Monday night, decided to apply to the L.G.B. for sanction to a loan for changing over the street lighting from incandescent gas to electricity. The Council has been experimenting with lamps of the metallic filament variety of late, and, providing the tests are satisfactory, will proceed with the application. On this subject a letter was reported from the South Suburban Gas Co., who, as ratepayers, stated that they would have no reason to complain if the streets could be lighted by electricity giving an equal light for less cost or a better light for the same cost. They suggested that they should be allowed to try inverted incandescent burners, so as to give a demonstration of their advantages for street lighting. The Committee recommended that the proposal in the latter part of the letter be accepted, on the condition that the experiment was carried out by the company at their own cost.

Brighton.—The Electricity Committee of the T.C. has arrived at an agreement for the supply of electricity for five years to the London, Brighton and South Coast Railway Co., at a fixed charge of £750 a year, plus ·56d. per unit metered. The cost of laying mains to give the supply is estimated at £4,000.

British Columbia.—At a recent meeting of the Institution of Mining Engineers, Mr. F. Keffer, in discussing the question of mining in British Columbia, stated that steam had practically been displaced in the Boundary district. Power is supplied from a plant some 25 miles distant from the centre of the district, and also from a station 85 miles distant. The former plant can generate from 2,000 to 3,000 H.P., which is transmitted at 20,000 volts. The latter plant can generate from 12,000 to 15,000 H.P., and the power available at the falls is said to be 60,000 H.P. The line voltage at present is 40,000 volts, although arrangements are made for bringing this up to 60,000 volts, should occasion require it. Some of the motors erected at the mines are as large as 600 H.P., one of this size and another of 500 H.P. being used to drive air compressors. Motors up to 100 H.P. run the crushers, and several of the haulages are electrically driven.

Cambridge.—For some two years past the question of the lighting of Fulbourn Asylum has caused considerable discussions at the meetings of the visitors, but at the last meeting, held on Monday, it was unanimously agreed that it be a recommendation to the Cambridge County Council, the Isle of Ely County Council, and the Cambridge Town Council, that the institution be lighted by means of electricity. In its report to the above Councils, the Lighting Committee explained that the Cambridge Electric Supply Co. was prepared to supply all mains on payment of an annual sum of £96, and 12,000 units for £200 and further energy beyond 12,000 units at 1½d. per unit, while it was also prepared to clean and maintain the lamps and shades for a further annual payment of £52. The scheme would involve an outlay by the three bodies mentioned above of £2,100, divisible as follows: The County, £897; the Isle, £712; and the borough, £490.

Continental Notes.—BELGIUM.—According to the *Financial News*, negotiations have been commenced in certain quarters with a view to creating a national electricity company for the purpose of supplying light and power to the whole of Belgium. The promoters state that the Government has approved the general principle of the scheme.

NORWAY.—A strongly financed syndicate has recently acquired, by purchase, the large waterfalls of the Aardalriver in Sogn, on the west coast of Norway, which river is the only outlet from the lake Tyin in the mountains of Yotunheimen. In order to obtain a constant supply of water during the whole year, it is intended to dam up the lake Tyin, which, in this case, will become one of the largest and most valuable water reservoirs in Norway. The future intention of the syndicate is to build large electrical works, for the purpose of exploiting one of the processes recently invented for extracting nitrogen from the air by means of electricity.

The carbide factory at Odda, in Hardanger (Norway), has now come into full work, and about 600 workmen are constantly employed.

The production of carbide is proceeding satisfactorily, and at the same time experiments are being made with a new compound of carbide for manuring purposes. These experiments have, however, not met with much success up to the present, and several accidents have happened; the electrical transformers have repeatedly been totally destroyed, and the work in this part of the manufactory has several times had to be discontinued.

BULGARIA.—A company is being promoted here for the supplying of Sofia with electric power and light. The capital of the company is to be 3,500,000 fr.

ITALY.—A company has just been formed at Cavaria with a capital of £8,000, and the title La Società Elettricita e Forzi Motrici, to establish an electricity generating station in the Val d'Arno.

The Italian Government *Gazette* gives an extract from a recent statement by the Minister of Agriculture, Commerce and Industries, on the electrical installations authorised in 1907, from which it appears that 226 plants were authorised for electric traction during the twelve months. This, compared with the preceding year, represents a decrease of 13. Eighty-eight generating stations with new plant were authorised, or 37 less than in 1906. The equipment of the stations represents a total capacity of 18,000 KW. According to districts, the greatest increase is noted to have taken place in the Piedmont and Lombardy, and the most important station equipped during the past year was that erected by the Hydro Electric Co., of Liguria, at Isola, near Parma, with a total capacity of 6,300 KW.

Dover.—It was reported to the T.C. on July 21st that a canvass of residents at St. Margarets-at-Cliffe was favourable to the electric light mains being extended to that place. The estimated cost is £3,000. Further particulars are to be obtained prior to the extension being decided upon.

Dundalk.—The U.D.C. is considering the electric lighting of the town, and is about to invite proposals to that end.

Dunstable.—Messrs. Foote & Milne, Ltd., having intimated that they intend applying for a prov. order for electric lighting, the T.C. has resolved to oppose the application. The Council has also resolved not to entertain an offer from Mr. F. T. Bennett, of Southend, to establish electricity works in the borough.

Edinburgh.—Recently a recommendation of the Electricity Committee in favour of reducing charges for electric lighting, in view of a £7,000 surplus on last year's working, was carried by 24 votes to 11. The present charge is only 3d. per unit.

On the 22nd inst. the Committee agreed, by six votes to five, to apply the whole of the electric lighting surplus, £9,794, to the relief of the rates. A motion that the amount should be applied in reduction of capital was negatived.

Greenock.—For some time past the Admiralty has been in communication with the T.C., as to the terms for the supply of electricity for lighting and power at the new torpedo factory. A report was submitted to the T.C. by the members who had waited on Admiralty officials in London, to the effect that the latter had conceded all that the Corporation asked with the exception of minimum payments, and had agreed to take from the Corporation all the electrical energy required for power and lighting purposes for 14 years, the Corporation to supply energy up to a maximum demand of 200 KW., with such increase as might reasonably be demanded. A formal agreement between the Admiralty and the T.C. was authorised to be completed on the above lines.

Haslingden.—The B. of G. on Monday discussed the amended offer of the Rawtenstall Corporation to supply energy for the lighting of the new workhouse by electricity. The rates were:—For 15,000 units, 3⅜d. per unit; for 20,000 units, 3⅛d. per unit; for 25,000 units, 3d. per unit; and for 30,000 units, 2⅞d. per unit. Mr. T. Woodcock moved, and Mr. H. Tomlinson seconded, a resolution accepting any offer by the Rawtenstall Corporation for the supply of current at a flat rate of 3d. per Board of Trade unit, with a five years' agreement on either side. This was carried despite a motion that the Board should generate its own electricity. A further quotation was requested for the supply of electricity for power purposes, by Rawtenstall.

Ilford.—The U.D.C. has received from the L.G.B. sanction to a loan of £27,000 for electric light purposes.

London.—WOOLWICH.—The B.C. has decided to extend the lighting mains to Court Road, Eltham, at an estimated cost of £2,000.

BERMONDSEY.—The seal of the Council has been affixed to contracts with (1) Babcock & Wilcox, for boiler; (2) Deane and Beale, for an evaporator condenser; (3) Siemens Bros., for a dynamo. The Council resolved to ask the M.P.'s for the borough to oppose the London and District Electricity Supply Bill, and appointed delegates to a deputation which is to ask the President of the Board of Trade to reintroduce the Supply of Electricity Bill. The Electric Light Committee submitted its report for the year ending March 31st, 1908, and estimates for the current year. The gross and net profits for the year ending March 31st last were £9,857 and £888. The total borrowings for the undertaking amount to £145,899, of which £6,812 has been repaid. Receipts from the sale of current amounted to £14,269. The following are com-

parative figures for the years ending March 31st, 1903, and March 31st, 1908:—Units generated, 358,776 and 2,972,191; sold for public lighting, 100,165 and 569,678; sold to private consumers, 284,158 and 2,672,617; total maximum supply demanded, 235 KW. and 1,055 KW.

L.C.C.—The Parliamentary Committee reported to the L.C.C. on Tuesday, in regard to the London Electricity Bills, as follows:—"We understand that the second reading of these Bills in the House of Commons is to be taken before the House rises, and that the President of the Board of Trade will move instructions to the Committee dealing with the Bills to the effect that the Council should be named in the London and District Bill as the purchasing authority, and also to the effect that the Committee should be empowered to insert a clause in the other Bills, transferring on equitable terms to the Council, the purchasing powers now vested in the borough councils and City Corporation.

"The Council has no wish or desire to take away from the borough councils any powers now vested in them, but undoubtedly great difficulty is presented by the fact that each borough at present has, generally speaking, power to buy only those portions of the undertakings of the companies which are actually within its own area. The result is, that in many cases the purchasing rights extend to parts of systems only and are wholly ineffective. This will be remedied by the proposed transfer to the Council, and so long as this takes place on terms equitable to the borough councils, we see no reason why the Council should oppose the proposal of the Board of Trade.

"We presume that if the consolidation takes place, it would be open to the Committee to consider the question whether the borough councils should have the right of repurchasing from the Council the distribution system within their own areas."

MARYLEBONE.—The financial statement of the second complete year of the B.C.'s electricity undertaking, shows that the total capital expenditure at March 31st last amounted to £2,008,108, of which £42,503 was expended during the 12 months. The loans received during the year ended March 31st amounted to £92,692, making a total borrowing of £1,984,092 (after allowing for £15,000 received from the Metropolitan Electric Supply Co. for the purchase of motor-generators). The total repaid at March 31st was £28,873 (or £43,873, including the £15,000 mentioned above), leaving a net liability as regards mortgage debt of £1,955,218. The gross revenue amounted to £151,778, and, allowing for bad debts, the gross income totalled £161,492, compared with £158,459 for the previous year. Of this, working expenses, management, &c., absorbed £50,920, and special expenses brought the total charges on revenue account up to £57,659. The ordinary costs per unit sold averaged 1·389d., compared with 1·45d. for the previous year; generation costs were reduced from ·77d. to ·731d., due to more economical methods of working generally; but distribution expenses show a slight increase—·23d., compared with ·22d. for the previous year. The average price charged for current to private consumers, worked out (including meter rents) at 4·38d., compared with 4·7d., the average yield for the previous year, and 5·15d. for the year ended March, 1906. The net increase in the number of units sold was 629,175. The net increase of sales to private consumers was 543,532 units, or nearly 7 per cent. With regard to the net revenue account, there was a deficiency on the year's working of £3,136. The shortage, say the Committee, is mainly due to the lower average price now obtained. The Committee feel assured, however, that the lower charges now made are creating a fresh market for the development of the undertaking, and that the tariff generally is perfectly sound. Energies must now be devoted to increasing the sales and stimulating the demand in order that the heavy standing charges may be spread over a broader basis. The balance in hand at March 31st, 1907, was £29,325, out of which the deficiency will be met, leaving a credit balance at March 31st last of £26,189.

GREENWICH.—In a report upon Major Cardew's experiment of deodorising sewer gases by means of an ozone generating apparatus, suspended, in each manhole and supplied with energy from the street mains, the Public Health Committee stated that although the apparatus might deal with the normal flow of sewer gas, it was doubtful whether it would treat effectively gas coming from sewers at high pressure. Major Cardew estimated the cost of a single installation, including cables and street work at £30, and the upkeep, provided not less than 20 apparatus were installed, at £3 per installation per annum. It would only be necessary to install the apparatus for about 60 days per annum, and, therefore, the cost per manhole would not exceed £4 per annum.

Morecambe.—A case was heard at the County Court recently, in which the Corporation sued Mr. W. Pyrah for the recovery of £30 for electricity supplied during the quarter ending the year 1906. The point in dispute, which has dragged on for two years, appeared to be that the charge was considered very excessive as compared with corresponding quarters, and Mr. Pyrah objected to pay the amount. According to the *Morecambe Visitor*, the defending solicitor argued that the judge had no jurisdiction to try the case, but that it could only be dealt with by an electric lighting inspector appointed by the Board of Trade, at the request of Mr. Pyrah and several others. This inspector would act as an arbitrator and decide between the parties what the amount would be. However, the Corporation won the case, for his Honour decided that he had jurisdiction to try the case. The judge argued that the inspector who was only appointed in March of this year could not determine whether the meter was right or wrong during the quarter ending 1906, which was two years earlier. Mr. Pyrah will now have to pay the amount, together with costs. The case is interesting, since it has settled the Corporation's standing with regard to disputes on electric light.

Motherwell.—The total energy sold during the past year's working amounted to 1,964,683 units. The revenue was £12,039, and, after meeting working and financial charges, the net profit was £859.

Plymouth.—A return has been presented to the Corporation of the working of the electricity undertaking for the quarter ended June. It showed a sale of 482,355 units, and estimated receipts £4,764, compared with 435,967 units sold and £4,556 received in the corresponding quarter of last year. For the first time the return recorded a considerable reduction in the use of energy for private lighting, the consumption being 9,500 units and the receipts £200 less than last year. This loss was, however, more than made good by the large increase of 25,000 units in the consumption of energy by the Corporation trams, which yielded an increased revenue of £330. There was also a satisfactory increase in the use of energy for private motors.

St. Helens (Isle of Wight).—The U.D.C. has accepted the tender of the Isle of Wight E.L. & Power Co. for public lighting at Seaview, Nettlestone, Priory Bay and Springvale, for five years, at 50s. per lamp per annum.

Southampton.—The T.C. has decided against the recommendation of the Electricity Committee that Parliamentary powers be obtained to carry out free and assisted wiring, hire out lamps, &c., at a rental or on the deferred-payment system.

South Stoneham.—The P.C. has informed the R.D.C. that it sees no objection to Southampton T.C. obtaining powers to supply electricity to the parish, subject to the R.D.C. being entitled to purchase that portion of the undertaking by arbitration.

Tonbridge.—A L.G.B. inquiry was held on July 23rd into the application of the U.D.C. for a loan of £4,200 for electric light purposes, including £966 for 150-KW. steam dynamo, condenser and spare armature; £308 for steam and water pipes; £246 for switchboard extensions; £120 for extension to economiser; £540 for Lancashire boiler, &c.; £612 for past expenditure on mains, &c.; and £887 for future extensions to mains, &c. There was considerable opposition, and the inspector striking out several items, reduced the sum applied for to £3,600.

Watford.—The U.D.C. has decided to apply to the L.G.B. for a loan of £1,575 for a surface condenser, with pumps, pipes, &c., superheaters, pipes for cooling water, &c.

TRAMWAY and RAILWAY NOTES.

Aberdeen.—The annual report on the working of the tramways, shows that the total revenue for the year 1907-8, amounted to £71,930; the working expenses were £38,669; financial charges amounted to £18,341, and the balance to £14,920, which latter compares with £13,423 in 1906-7. Altogether 1,566,119 car-miles were run, and 17,517,304 passengers carried. The surplus went to the renewals fund which now stands at £31,809.

Argentine.—The Senate of the Province of Buenos Ayres has, after some two years' delay, approved the Bill authorising the electrification of the tramways in the City of La Plata.

Australia.—A tramway strike began unexpectedly at Sidney on the 24th inst., some 3,000 men being concerned. The cars were left standing in the principal streets; the cause of the strike is stated to be the dismissal of a conductor for alleged dishonesty. A modified service, run by non-unionists, was put into operation on the 25th, when the cleaners and shed hands, also many of the power station employés, came out on strike. It is stated that the railway drivers and firemen may be drawn into the dispute.

Belfast.—At a T.C. meeting last Friday it was decided by a large majority to cancel the recently-instituted halfpenny fares and stages, and put into operation the stages and fares recommended three years ago by Mr. Nance, manager. The recent innovation resulted in a direct loss of about £300 per week. That, however, has not ended the trouble, as a protest has been lodged against the alteration in the fares and stages, on the grounds that these can only be altered annually under Sec. 68 of the Belfast Tramways Act, 1904, and therefore the cancelled fares are the legal ones, they having been the first arranged after the annual meeting. At a meeting on the 27th inst. the legal point raised was discussed and submitted to the town clerk, Sir Samuel Black, for consultation.

Blaydon.—The U.D.C. has asked the Newcastle-on-Tyne T.C. to extend the electric tramways from Scotswood to Blaydon, and the matter is being considered by the Tramways Committee.

Brentford.—At the meeting of the U.D.C. on the 21st inst., the report of Col. Yorke, of the Board of Trade, upon his inspection of the London United Tramway Co.'s lines in High Street, Brentford, was read. Col. Yorke stated that the rails were much worn and parts projected well above the road surface. He found that a special raised lip had been fixed to to metals at crossings; such raised lips had always been objected to by the officers of the Board of Trade, and they were quite contrary to the Act of Parliament, which said, "That the rails shall be upon a level

with the roadway." The points were in bad condition, being worn in many places to an undue degree, and the woodwork between the track was in bad condition, but he could not specify the places, as they were so many. The condition of the track was a source of inconvenience to the ordinary traffic and a possible danger to motor-cars and bicycles. He found that "there had been default in maintaining and keeping in good condition and repair so as not to be a danger and inconvenience to the ordinary traffic." He recommended "that the company take steps to put the track into order." The members of the U.D.C. considered the report fully maintained the position they had taken up, and that they could sue the company for penalties, but they decided, before taking any action, to ask the company for an undertaking to do all that was necessary to comply with Col. Yorke's recommendation.

Bury.—At a meeting of the T.C. last week a proposal to extend the Radcliffe tramway lines to Little Lever was reported. In the event of the Little Lever Council deciding to construct the lines, the Bury Corporation will work them at a cost equal to the working expenses.

The traffic receipts on the different sections of the Bury tramways from April 1st to July 12th, 1908, amounted to £18,137, as compared with £16,322 in the corresponding period of 1907, an increase of £1,814.

Continental Notes. — AUSTRIA. — After prolonged negotiations, the Vienna City Council has agreed to take over the tramways and omnibus services of the Vienna General Omnibus Co. at a total price for buildings and stock of about £58,350.

HUNGARY.—The Gesellschaft für Elektrische Unternehmungen, of Budapest, is forming a separate company to construct the Bac-Budapest-Godolloer electric railway, the working of which will be undertaken by the Hungarian State Railway authorities.

SPAIN.—Plans for the construction of an electric railway from Valladolid to Toro, in the Provinces of Zamora and Valladolid, are being prepared.

GERMANY.—An electrical fire service car is to be added to the equipment of the Fire Brigade of Aix-la-Chapelle.

Messrs. Siemens & Halske, of Berlin, are interested in a scheme for the construction of an electric tramway between Bochum, Harpen and Gerthe.

Plans are being prepared in respect of a projected electric tramway between Dresden and Klotschke.

ITALY.—A company has just been formed in Ancona, with a capital of £22,000 and the title La Società Tramvie Imprese Elettriche.

Conway.—On behalf of the Light Railway Commissioners, a public inquiry was held on Saturday relative to an application upon the part of the Dolgarrog Aluminium Corporation for an order, amongst other things, to construct a railway. It is proposed to make the railway 3½ miles in length, to be named the Abbey, Dolgarrog and Trefriw Light Railway, and to be worked by electrical energy. Powers were also sought to abstract and direct certain waters from the Afon Dulyn river in order that water-power might be utilised for the purpose of generating electricity to work the line. It was stated for the promoters that the capital expenditure of the scheme would amount to £200,000, and, practically speaking, there was no serious opposition to it other than a desire upon the part of certain parties to introduce protective clauses into the Order.

The Commissioners intimated that they agreed to the Order for the railway being granted, subject to an agreement being entered into concerning the acquisition of a small mill at Talybont or its water rights, and also on the distinct understanding that the line would be continued to Trefriw, and not only so far as the aluminium works.

Huddersfield.—The financial statement respecting the Corporation tramways for the quarter ending June 30th is of a very satisfactory character, the rate of profit earned for some time past being well maintained. The capital outlay to date is £412,902. The income for the quarter is £22,110, or 10·45d. per car-mile, against £21,295 and 10·92d. for the corresponding period of last year. The total working expenditure amounts to £11,421, or 5·40d., compared with £10,198 and 5·23d. last year, leaving a gross surplus of £10,689, or 5·05d. per car-mile, against £11,097 and 5·69d. for the corresponding quarter of 1907. Rent of leased lines (Linthwaite), £301; interest on capital, £3,254; and redemption of debt, £2,467—a total of £6,022. After providing £3,097 for depreciation (3 per cent.) there is a net surplus of £1,570, or ·74d. per car-mile, compared with £2,031 and 1·04d. last year. The reserve or renewals account stands at £45,706. The miles run this quarter were 507,980, compared with 467,899 in the corresponding period of last year.

London.—L.C.C.—At Tuesday's meeting, the Highways Committee presented a report on the working of the Council's tramways during the year ending on March 31st last, from which the following details have been obtained:—

Miles in operation:		
Electric traction	68⅝	
Horse traction	51⅛	
		119¾
Total capital expenditure...		£8,414,590
Debt repaid:		
Out of revenue		319,376
From sale of materials, &c.		264,515
Debt outstanding		7,262,139

The receipts and working expenses for the year were as follows:

	Electric traction.	Horse traction.	Total.
Total receipts ...	£1,274,660	£388,371	£1,663,031
Working expenses	724,381	445,734	1,170,115
Surplus on working			£492,916

Against the surplus have to be set the following charges:—

Debt charges—		
Interest (gross)	£233,821	
Repayment	216,203	
		£450,024
Income-tax (after crediting £11,691 for tax retained from interest on debt)		3,309
Interest on purchase-money		423
Parliamentary expenses		2,350
Deficiency on Drake Buildings (re-housing obligation)		96
		£456,202
Less net interest on cash balances, &c.		8,692
		£447,510

Deducting this amount from the surplus of £492,916, there is a net balance of £45,406, which, together with £5,923 brought forward from the previous year, has been carried to the renewals fund. In the case of electric traction, the operating expenses are equivalent to 6·79d. per car-mile, as compared with 7·06d. per car-mile in 1906-7, and the working expenses in connection with horse traction represent 10·73d. per car-mile run. Considerable loss was sustained during the reconstruction of horse lines for electric traction, as not only were some of the routes entirely closed, but sections of other routes had to be closed, and this disorganised the whole traffic on important through lines. The following are the details of the year's traffic:—

	Electric traction.	Horse traction.	Total.
Number of passengers ...	279,166,461	93,349,293	372,515,754
Number of car-miles run ...	25,591,028	9,970,161	35,561,189

The total number of units generated during the year at the Greenwich generating station was 51,805,633, and the cost amounted to ·570d. per unit, including interest and sinking-fund charges, as compared with a cost during 1906-7 of ·676d. per unit. These figures relate to cost of generation only.

STOKE NEWINGTON.—The B.C. has decided to call upon the London County Council to put in hand at once the electrification of the Green Lanes tramway line.

WOOLWICH.—The B. of T. has inspected the new section of the L.C.C. tramways from Plumstead Church to the county boundary at Abbey Wood. The new line gives a connection with the Erith Council's tramways, reaching almost to the Gravesend system.

Lowestoft.—Recently considerable discussion occurred at the T.C. meeting, on a proposal to institute a universal 2d. fare on the tramways during the month of August, workmen's and children's fares remaining at 1d. Eventually it was decided to retain penny fares as at present.

Manchester.—It is announced that the Manchester Tramways Committee has decided not to begin work on the Sale to Northenden line (for which Parliamentary powers were obtained some time ago) during the present year. The work will necessitate a good deal of road widening. The intention is, ultimately, to link up this route with Palatine Road and Cheadle.

Penarth.—The District Council is contemplating seeking powers to run an electric tramway from Penarth to Cardiff, and it is probable that a poll of the ratepayers will be taken on the question at an early date.

Rochdale.—The local Tramways Committee is proposing to extend the Healey route to Whitworth, in addition to inaugurating through-running to Bury.

West Bromwich.—The annual report of the receipts and expenditure in connection with the Corporation was issued on Monday, in which it was stated that in connection with the tramway department the expenditure to date was £147,758. The amount received as rent up to March 31st, 1908, was:—South Staffordshire Tramways Lessee Co., £6,979; Birmingham and Midland Tramways Co., Ltd., £1,627; total, £8,606; and there was a surplus on the repairs account of £58. There was a deficit on March 31st of £1,092.

West Ham.—The accounts of the Corporation's tramway undertaking for the financial year ended March 31st, which have just been issued, show expenditure totalling £76,717. The total income credited to the revenue account amounts to £121,013. The gross profit carried to net revenue account amounts to £43,831. A balance totalling £25,945 on the net revenue account has been carried to appropriation account. Against this sum are chargeable items of £9,945 for contributions to sinking fund, and to capital account, pending permanent borrowing; £2,520 in respect of 20 top covers to cars, a bonus scheme, and certain establishment charges; and £5,378 for relief of rates. After debiting these amounts, there remains a balance of £8,101, and of this it is proposed that £7,436 should be applied to reserve or renewals fund, and the remainder to the expenses of obtaining the provisional order, 1907. The sum to credit of the reserve and renewals fund at March (including the £7,436 mentioned above) is £27,711. In this connection the borough treasurer has reported that although a con-

tribution has been made each year to the fund, no fixed principle has been adopted by the Electric Lighting and Tramways Committee with regard to the amount which should be set aside annually. The Committee has now referred the matter to the borough treasurer, borough engineer, and tramway manager, to bring up a report on the matter for consideration before the close of the present financial year. With regard to capital account, the treasurer's statement shows that the total net capital expenditure to date amounts to £508,785. The expenditure during the year was £6,900, made up mainly in respect of contracts for erection of car-sheds, offices, provision of cars, &c.

Whitworth.—The extension of the Rochdale tramways into the Whitworth district is at present under the consideration of the Rochdale Council. Bases of negotiation have been agreed upon between the Tramways Committee and the Whitworth local authority, and a meeting will shortly be held, at which it is expected definite arrangements will be made.

TELEGRAPH and TELEPHONE NOTES.

Bulgaria.—By arrangement with the Russian Government, a cable has been laid between Varna and Sebastopol. The Bulgarian Government is also negotiating for the installation of the Marconi system of wireless telegraphy at Varna.

New Telegraph Stations.—The Egyptian Administration states that telegrams for Kadugli may now be accepted, but that they must be addressed "Kadugli Talodi," which counts as two words. Offices have been opened to the International Telegraph service at Farm Voigtland and Hohewarte, in German South-East Africa, and at Nyanga in Cameroon. An office has also been opened at Kpandu, in Togoland, and the African Direct Telegraph Co. announces that telegrams may now be accepted for the following places, viz.:—Baro, Katcha, Kuta and Offa, in Northern Nigeria; at Ede Ilegbo, Ikerun, Iwo, Lalupore Okuku, Olodo, Origo, Oyo Road and Skaki, in Southern Nigeria. In the latter division offices have also been opened at Ito and Uwet. The station at Old Calabar is now known as Calabar. The following offices in Southern Nigeria have been closed:—Akwanaja, Dongeru, Fort Goldie, Kerana, Odeni, Shonga, Stonga, Saki, Wushishi, Opeji, Arigbajo and Lagia. The Gold Coast also owns two more telegraph offices—viz., at Tamale and at Wa.

New Zealand.—The telegraphic system of this Colony increased by 1,633 km. of line and 5,380 km. of wire during the year 1906-7, and attained a development of 14,415 km. of line, and 43,520 km. of wire, while the number of offices increased from 1,200 to 1,447. The system dealt with 6,160,080 private and Press telegrams, and 236,252 Government telegrams, making a total of 6,396,332 telegrams, an increase over the previous year of 756,113. The average per person for telegrams sent, is 6·84. The Pacific cable took 25,280 ordinary and 36 Press telegrams to Australia, a total of 25,316, while the Eastern Extension Co. captured 3,431 ordinary, and 153 Press, or a total of 3,584 telegrams. It will thus be seen that the collections of the Pacific Cable of traffic for Australia exceed the Eastern very largely. As regards traffic from New Zealand to other countries than Australia, it is found that while the Pacific cable captured 68,919 ordinary, and 632 Press telegrams, the Eastern Extension Cable Co. captured only 8,091 ordinary, and 994 Press telegrams; the total collections on all traffic originating in New Zealand are 94,867 by the Pacific, and 12,669 by the Eastern Co., thus showing that the Pacific cable has a strong hold in New Zealand. The cable traffic for the year 1906-7 exceeded the previous year's figure by 14,943. Ordinary traffic to New Zealand increased from 81,717 to 95,568 telegrams, of which 67,216 were carried by the Pacific cable and 28,352 by the Eastern Extension Co., so that even here the Pacific cable captures about 66 per cent. of the traffic. Traffic receipts increased owing to the increase of traffic, and stood at 5,167,669 fr., as compared with 4,609,232 fr. for 1905-6; an increase of 437,175 fr. The New Zealand system collected on behalf of other administrations a sum of 1,469,242 fr.

Telephones.—From 1,425 km. of line and 20,605 of wire the system rose in 1907 to 1,525 km. of line and 24,272 of wire, the increase being 261 km. of line and 6,528 of wire. The number of subscribers to the telephone service increased from 15,333 in 1905-6 to 17,403 in 1906-7, or by 2,070. Wellington claimed 2,706 of these; Auckland, 2,224; Christchurch, 2,162; Dunedin, 1,995; Wanganui, 529; Napier, 497; Lisborne, 466; Invercargill, 457; Palmerston North, 451; and New Plymouth, 347. Receipts rose from 2,238,552 fr. in 1905-6 to 2,520,350 fr. in 1906-7, an increase of 281,798 fr. Expenditure on account of the Telegraph and Telephone service, exclusive of subsidies for cable communication, amounted to 6,914,515 fr. in 1905-6, and to 7,283,991 fr. in 1906-7, an increase of 369,476 fr. The expenses for maintenance absorbed 2,329,832 fr., against 2,226,178 in the previous year. Up to March 31st, 1907, the Treasury had spent 33,106,114 fr. on account of construction. The Telephone services gave a return of 3·47 per cent. on the capital expenditure of 10,502,215 fr., the surplus being 364,694 fr.

The total financial results were: Receipts, 8,125,194 fr.; expenditure, 7,283,991 fr.; surplus, 841,203 fr.—*Journal Télégraphique.*

Pollak-Virag Telegraph.—This system, by which 40,000 words an hour can be transmitted, and received in written characters, is on view at the Franco-British Exhibition, and has excited the daily Press. It was fully described in our pages in March and October, 1900.

Radio-Telegraph Convention.—The Berlin Convention of November 3rd, 1906, with the Protocol, &c., has been ratified by the Governments of Germany, Belgium, Brazil, Bulgaria, Denmark, Spain, Norway, Holland, Roumania, Sweden, Japan, Mexico and Great Britain, and by the latter country also on behalf of Canada, Australia, New Zealand, Cape Colony, Natal, Transvaal and British Indies, and its other colonies and protectorates.

Switzerland.—The telephone is coming into general use in Switzerland. There are 59,100 subscribers to the Federal telephone system; 35,755,500 local conversations and 7,978,500 trunk-line calls are made during the year.

Telegraphic Interruptions and Repairs:—

Cables.	Interrupted.	Repaired.
Curacao-Coro Curacao-La Guayra } Closed .. Curacao-Maracaibo	Jan. 12, 1906 ..	..
Tarifa-Tangier	Jan. 18, 1904 ..	..
Port Arthur-Chifu (Closed)	Mar. 9, 1904 ..	..
Las Palmas—Arrecife	May 18, 1908 ..	..
Cayenne-Salinas	May 9, 1908 ..	July 24, 1908
Pera-Dardanelles	May 20, 1908 ..	..
Sierra Leone-Accra	May 28, 1908 ..	..
Cadiz-Tangier	June 3, 1908 ..	..
Kwandang-Menado	July 9, 1908 ..	..
Cotonou-Grand Bassam	July 20, 1908 ..	..
Djedda-Souakim	July 27, 1908 ..	..

Wireless Telegraphy.—The *Official Gazette* of Italy announces that the Government has received a telegram from the man-of-war stationed at Mombassa, the *Staffetta*, stating that the radio-telegraph stations at Mogadiscio, Merka, Brava and Giumbo have been opened, and are in regular working order. By means of the British wireless station at Lamu the messages are transmitted from Kisimaio to Mombasa, to the vessels of the Italian navy at that port.

It is reported that the battleship *Connecticut* has succeeded in communicating with the wireless station at San Diego from a distance of 2,000 miles.

The Mersey Dock Board has decided to fit the North-West light-vessel and Bidston lighthouse with Marconi installatiens.

Last week successful experiments were made near Berlin with the dispatch of wireless telegrams from a dirigible balloon.

CONTRACTS OPEN and CLOSED.

OPEN.

Algiers.—August 6th. Contracts are open for three years' supply (65,645 pieces) of impregnated wooden telegraph poles for the Algerian Telegraph Service. Particulars can be obtained from the Inspector-General, 12, Rue Dumas d'Urberville, Algiers.

Australia.—ADELAIDE.—August 26th. The Postmaster-General requires tenders for 9 tons hard-drawn copper wire, 200 lb. per mile, specification No. 3; 3,000 copper tapes for 200-lb. wire, and No. 5 insulators, as per specification No. 195, to be packed in bundles of 100 each; 3,000 copper binders for 200-lb. wire and No. 5 insulators, as per specification No. 195, to be packed in bundles of 100 each; and 3,000 No. 5 insulators. Specifications may be inspected at the ELECTRICAL REVIEW office.

ADELAIDE.—September 9th. Tenders are invited by the Deputy Postmaster-General, Adelaide, for the supply of one numbering machine and one machine for stamp perforating. Tenders must be sent in on the proper forms, obtainable at 72, Victoria Street, Westminster, S.W. The machines must be fitted with electric motors.

BRISBANE.—August 24th. The Postmaster-General requires tenders for iron, copper and covered wires, as per schedule 55, insulators, as per schedule 54, and ironwork, as per schedule 53.

Belgium.—August 11th. The municipal authorities of Louvain are inviting tenders for the concession for the supply of electrical energy for public and private lighting and power purposes in the town. Full particulars can be obtained from Le Directeur de l'Usine de Pas, while tenders are to be sent to Le Collège des Bourgmestre et Echevins de la Ville de Louvain.

Cornwall.—August 3rd. The Great Western Railway Co. wants tenders for the erection of an electricity generating station at Fowey, Cornwall. Particulars at the office of the engineer at Plymouth (North Road) Station. Tenders on or before Monday next, to G. K. Mills, Secretary, Paddington Station, London.

Devonport.—General stores for the Corporation Electricity Department. Borough Electrical Engineer.

Eccles.—Steel steam pipes and cast-iron circulating water pipes, &c., for the T.C. Specifications and drawings from the Borough Electrical Engineer, Patricroft.

Edmonton.—August 26th. Electric lighting installation at the Nurses' Home for the Guardians. See "Official Notices" to-day.

Finchley.— August 6th. Switchgear for the U.D.C. See "Official Notices" July 17th.

France.—August 4th. The Post and Telegraph authorities in Paris are inviting tenders until August 4th for the supply of 60 tons of bronze wire, 2 mm. dia.; 40 tons ditto, 3 mm. dia.; 10 tons of galvanised-iron wire, 1 mm. dia.; 100 tons ditto, 3 mm. dia.; and 2,000 tons ditto, 4 mm. dia. Particulars may be obtained from, and tenders are to be sent to, Le Sous-Secretariat d'Etat des Postes et des Télégraphes, 103, Rue de Grenelle, Paris.

Germany.—The municipal authorities of Belzig (Saxony) are about to invite tenders for the establishment of a central electric lighting station in the town.

Tenders are about to be invited by the municipal authorities of Reichenbach (Saxony) for the establishment of a central electric lighting station in the town, at an estimated cost of £50,000.

Glasgow.—Providing and erecting feed pumps at St. Andrews Cross power station. Mr. W. W. Lackie, City Electrical Engineer.

London.—September 7th. General Post Office. The Postmaster-General invites tenders for the supply of telegraph poles of (*a*) home-grown larch or fir, and (*b*) Swedish, Norwegian, Finland, or Russian red fir, to be felled during the winter of 1908-9, and to be delivered during the following summer. Particulars from Mr. G. Morgan, Controller of Stores, Stores Department, G.P.O., 17-19, Bedford Street, London, W.C.

METROPOLITAN ASYLUMS BOARD.—September 1st. Storage battery, booster, switchboard, &c., for the training ship *Exmouth*. See "Official Notices" to-day.

Norwich.—Sewage screening and electrical lifting gear at Trowse sewage pumping station for the T.C. A. E. Collins, City Engineer, Guildhall, Norwich.

Peru.—The Direction of the "Credito Urbano" of Arequida is about to invite tenders for the conversion of the tramway in the town to electric traction.

Radcliffe.—The Hauxley Parish Council invites provisional offers for providing and establishing 21 electric street lamps with aerial wiring, ready for receiving the current. Apply to W. Gibson, Clerk, 94, Queen Street, Amble.

Rawtenstall.—August 15th. Sixteen tramcars, and station lighting, wiring, instruments, &c., for the Corporation. See "Official Notices" to-day.

Russia.—September 14th. The Town Clerk of Odessa (Upiawa) will receive tenders for a concession to erect and work a power and lighting supply. A central station of a minimum of 6,000 H.P. is to be erected and equipped.

Sierra Leone.—August 22nd. The Municipal Corporation of Freetown invites tenders for the lighting of the municipal buildings and streets by arc and incandescent lamps. Tenderers to quote price per 1,000 units. The exclusive right to supply electricity for private lighting for a period of at least 30 years will be granted to the successful tenderer. The right to install electric tramways may also be acquired. Tenders to Town Clerk, Freetown. Some further information may be seen at the office of Messrs. Wilkinson & Broadbent, 4, Queen Street Place, E.C.

Spain.—September 25th.—The Spanish Ministry of Public Works is inviting tenders for the concession for the construction and working of an electric tramway in Madrid between La Glorreta de Alonso Martinez and Chamartin de la Rosa.

The municipal authorities of Pradoluergo (province of Burgos) have just invited tenders for the concession for the electric lighting of the town.

Stockport.—The Electricity Committee wants offers to purchase two D.C. Parsons turbo-generators. See "Official Notices" July 24th.

Watford.—September 1st. Surface condenser and pumps for the U.D.C. See "Official Notices" to-day.

Wolverhampton.—August 7th. The Borough Council requires tenders for uniform overcoats for tramway employés, according to particulars obtainable from Mr. W. A. Luntley, General Manager, Car Depôt, Cleveland Road.

Wrexham.—August 8th. Superheater for the Corporation. See "Official Notices" to-day.

CLOSED.

Australia.—MELBOURNE.—City Council. 500 incandescent lamps and holders, £33 5s., A.E.G.

BRISBANE.—Postmaster-General. 1,000 Daniell glass cells 1s. 5½d. each; 200 Callaud glasses, 2s. 6d. each; 3,000 sets glas. cells for Meidinger battery, 1s. 9¾d. each; 1,500 No. 2 Carporous glasses, 6d. each; 5,000 cords and tubes for Meidinger battery, 1½d. each.—Brisbane Electrical Co. 2,500 Daniell porous cups, 4¼d. each.—C. A. Stone. 600 cross-arms, £107 10s.—H. Henderson.

MELBOURNE.—Postmaster-General. Supply and delivery complete of two submarine cables between Victoria and Tasmania, £47,955.—Siemens Bros., London. Also same firm for spare cable, as follows:—30 nautical miles of main cable, £89 14s. per n.m., £2,691 5s.; 5 n.m. of intermediate cable, £134 17s. per n.m., £674 5s.; 5 n.m. of shore-end cable, £225 6s. per n.m., £1,126 10s. 11 sections of a common-battery switchboard, 3,000 subscribers, telephone and other apparatus, £19,313 5s.—R. B. Hungerford. 20 tons 400-lb. galvanised iron wire.—Richard Johnson, Clapham and Morris, Ltd., £275. Ditto, Government of Victoria. 20,000 insulators, 10,000 jarrah sleeves, £343 15s.; 1,200 stoneware conduits, £134 3s. 4d.—George Sweet.

SYDNEY.—Postmaster-General. 14¼ tons hard-drawn copper wire (300 lb. per mile), £70 18s. 7d. per ton; 4 cwt. copper binding tape (200 lb. per mile), £4 2s. per cwt.—British Insulated & Helsby Cables. 3,500 best white large insulators, 6½d. each.—Siemens Bros. Dynamo Works, Ltd. 1,000 Fallowwood cross-arms, 3 ft. 10 in., at 1s. 2d. per cross-arm; 2,500 ditto, 5 ft. 2 in., at 1s. 3d. per cross-arm.—Langley Bros.

Belfast.—The T.C. has accepted the tenders of W. Lucy and Co., Ltd., for house service cut-outs, and of the British Insulated and Helsby Cables, Ltd., for trolley wire.

Bristol.—The Electrical Committee has recently placed the following contracts:—

British Thomson-Houston Co.—Extra-high-tension and low-tension switchgear for Avonbank sub-station, £2,255.
Frank Chown, Bristol.—Concrete gallery for power distribution board, Avonmouth, £112.
Harrison & Colmer, Ltd., Bristol.—Extension of switchboard gallery, Avonbank. £312.
Geipel & Co., London.—Arc lamp carbons, 1908-9, £318.

Burnley.—Messrs. Ed. Bennis & Co., Ltd., Little Hulton, Bolton, have received an order for the installation at the Corporation electricity works, Burnley, of a complete coal and ash-handling plant, including a gravity-bucket conveyor and elevator, overhead bunker, and overhead ash hopper for ten boilers. The whole plant is motor-driven.

Derby.—The T.C. has accepted the tender of Mr. G. F. Tomlinson for the lay-out in connection with the new car-sheds in Nottingham Road, at £568 17s.

Farnborough.—The Electrical Apparatus Co., Ltd., has received the complete contract for the electric lighting of Farnborough Hill, Farnborough, the residence of the Empress Eugenie.

Gillingham (Kent).—For installing the electric light in the schools the following tenders were accepted by the T.C.:—

Medway Motor Engineering Co.—Byron Road Schools, £84; Barnsole Road Schools, £91; Richmond Road Schools, £87; Richmond Road, Infants, £58. These were the lowest tenders, the highest being £229, £257, £220 and £168 respectively.

High Wycombe.—The Borough Education Committee has accepted the tender of the High Wycombe Electric Light Co. for electric light fittings for Spring Gardens Schools, at £79 19s.

Liverpool.—The Mersey Railway Co. has placed an order with Messrs. Milnes & Voss, Ltd., of Birkenhead, for four additional trailers, to be ready for next winter's service. Alterations to existing stock are also to be carried out, and this work will be entrusted partly to Messrs. G. Marshall & Co., Liverpool, and partly to the railway company's own staff.

London.—STRATFORD.—The tender of Messrs. G. N. Haden & Sons, at £106, has been accepted for the installation of electric lighting in a portion of the West Ham and East London Hospital.

FULHAM.—The Electricity and Lighting Committee of the Borough Council has accepted the following quotations for a crane and grab and electric motor to be provided for clearing the river sump at the electricity works, at a total estimated cost of £178 (which amount includes £20 for foundations, fixing machinery, &c.):—

Lewis & Lewis.—Crane	£84
— Priestman.—Grab	59
The British Thomson-Houston Co.—Electric motor	35

WOOLWICH.—The Borough Council has accepted the tender of Messrs. Siemens Bros. Dynamo Works, Ltd., in substitution for that of the British Thomson-Houston Co., Ltd., for the supply of a motor-alternator. At the last meeting of the Council, the Electricity Committee reported that in submitting for approval the final specification and conditions as agreed with the borough electrical engineer, the British Thomson-Houston Co. declined to conform to the Council's standing order requiring them during the continuance of the contract to display upon the site of the works, and in their workshops, &c., a copy of the rates of wages and hours of labour to be observed in carrying out work for the Council. The Committee therefore approached three other firms whose guaranteed efficiencies of the motor-alternator were appreciably near that of the British Thomson-Houston Co. Messrs. Siemens Bros. Dynamo Works, Ltd., were prepared to agree to all the conditions of contract and to the borough electrical engineer's specification without qualification, and if allowed to increase the amount of their tender from £775 5s. to £799 5s., were prepared to

guarantee an increased efficiency as follows:—Full load, 83; ¾, 81·5; ½, 77·5; ¼, 62. (Guaranteed efficiency in original tender:—Full load, 81; ¾, 75·6; ½, 68·6; ¼, 51·6.) The offer of increased efficiency, and the consequently amended tender, has been accepted. The amount of the tender of the British Thomson-Houston Co. was £784 10s.

Manchester.—The Bastian Meter Co., Ltd., has again secured the contract for the supply of 2½ and 5-ampere meters to the Corporation.

Middlesex.—The C.C. has received the following tenders for the construction of tramways:—4 m. 1 f. 2·90 c. length in Finchley Road, Hendon, to the Gt. North Road, Finchley; 7 f. 5·5 c. length from the Edgware Road to Finchley Road, Hendon:—

Thomas Adams		£120,095	Clift Ford		£116,979
Dick, Kerr & Co.	(accepted)	116,979	Wimpey & Co.		119,991
A. Fasey & Son		127,979	County engineer's estimate		121,347

Length of 1 m. 4 f. 9·6 c. from Green Lanes, Southgate, to Market Place, Enfield:—

Thomas Adams		£41,710	Law & Co.		£41,405
Dick, Kerr & Co.		40,643	J. Mowlem & Co.		40,342
A. Fasey & Son		43,821	C. Wall, Ltd.		45,027
Clift Ford		40,648	**Wimpey & Co.** ..	(accepted)	40,220
Holloway & Co.		40,918	County engineer's estimate..		41,350

Nottingham.—Messrs. Blackburn, Starling & Co. have secured the contract for electric light work at the Grand Theatre.

Pembroke (Co. Dublin).—The U.D.C. has placed an order with Messrs. Ed. Bennis & Co., Ltd., Little Hulton, Bolton, for two compressed-air furnaces for Lancashire boilers.

Rawtenstall.—The Education Committee of the T.C. has accepted the tender of Mr. Chas. Romily for wiring Alder Grange Schools for the electric light.

Southend-on-Sea.—The T.C. has accepted the following tenders:—

Measures Bros., Ltd.—Rolled steel joists for condenser tank, £7 12s. 6d. per ton.
Mr. H. Gilligiud (Societe Anonyme des Acicres d'Angleur, Belgium).—22 tons of rails, £6 2s. 6d. per ton.
Morris & Bastert.—Crane and gantry, £28 9s. 9d.
Glenfield & Kennedy.—Valve for condenser, £28.

Wakefield.—The Corporation, through Messrs. J. & J. Horsfield, Ltd., Dewsbury, has ordered from Messrs. Ed. Bennis and Co., Ltd., Little Hulton, Bolton, two stokers and self-cleaning compressed-air furnaces for a 9 ft. 6 in. diameter Lancashire boiler.

Walsall.—The Electricity Committee has accepted the following tenders:—

Coal for the electricity works for one year.—T. Boston & Son, Birmingham.
Cleaning out Hospital Street battery.—Chloride Electrical Storage Co.
Covering new steam pipes at electricity works.—Jones & Horsfield.
Feeder cable.—Callender's Cable & Construction Co.
60 car wheel tires, at £16 2s. 6d. per ton.—Baker & Co., Rotherham.

Walthamstow.—The U.D.C. has accepted the tender of A. Blackmore & Co. for 12 months' supply of 500 tons of anthracite "washed peas" from the Yniscedwyn Colliery, at £1 1s. per ton. The offer of Babcock & Wilcox, Ltd., to provide and fix a coal elevator and distributing chutes at the generating station, for £99 10s., has been accepted. For alterations and additions to the generating station the following tenders have been accepted:—Builder's work, W. Richardson, £530; steelwork, Norton Bros. and Co., £670.

Watford.—The U.D.C. has accepted the tender of Ferranti, Ltd., for the supply of two six-way fuseboards and 50 fuses, at £165 10s.

West Ham.—The Corporation Electric Lighting and Tramways Committee has decided to accept the tender of Ferranti, Ltd., at £247 13s., for the supply of switchgear. The tender was the lowest received.

CONTRACTORS' COLUMN.

[The following information is published in the interests of electrical contractors and others who are seeking for openings for new business. Considerable expense is incurred in the production of this column, and every care is taken to ensure that the information is new and accurate, but it will be understood that in a matter where so many correspondents are engaged, and where the amount of information to be handled is very large, this cannot always be guaranteed. If alleged inaccuracies are reported to the Editors, they will be fully investigated.]

ABERCRAVE (near SWANSEA).—House for R. Davies, Esq. Chas. S. Thomas' architect, Wind Street, Swansea.

ABERDARE.—Houses, Brook Street, Aberaman, for Henry Edwards, builder, Cwmaman; Abernant Road, for D. P. Jones, Seymour Street, and J. Williams, Cardiff Street; Milton Street, Cwmaman, W. E. Willis, builder, Ystrad.

ABERDEENSHIRE.—Alterations at Nether Cortes, Lonmay; J. Blake, architect, New Pitsligo, Aberdeen. Proposed alterations at Hatton School; A. H. L. McKinnon, architect, 245, Union Street, Aberdeen. Additions to steading, &c., on estate of Potterton; C. Stephen, architect, 177, Union Street, Aberdeen.

ABERGELE (DENBIGHSHIRE).—New Post Office in Market Street; alterations to property in Water Street, for H. E. Prichard.

ABERYSTWYTH.—Nineteen workmen's dwellings (£3,000); R. Jones, borough surveyor. Four houses, Caradoc Road; D. & M. Davies, builders, Aberystwyth. Gymnasium for College; Secretary, Athletic Society, The College, Aberystwyth.

AGECROFT (near MANCHESTER).—Twenty houses. A. Knowles, Ltd., Pendleton and Pendlebury.

AMERSHAM.—Five houses, Chesham Bois, three at Penn, three at Chalfont St. Peter, and six at Little Missenden; home for children at the Epileptic Colony.

ASHBOURNE (DERBYSHIRE).—Primitive Methodist Manse in Sandybrook Road.

ASHFORD.—Renovation of the Wesleyan Chapel, Mersham.

AUDLEM (CHESHIRE).—Conversion of Audlem Grammar School into higher elementary school.

BACUP.—New central Post Office. H.M. Office of Works, Storey's Gate, S.W.

BARNSLEY.—Two houses, Sherwood Street. Jas. Wyke, 67, Princess Street, Barnsley.

BEAUMARIS.—Roman Catholic Church (£2,000).

BELPER.—Important additions to Belper Wesleyan Schools.

BIRKENHEAD.—Additions to Nurses' Home at the Union Workhouse. E. Kirby & Sons, architects, 5, Cook Street, Liverpool.

BIRMINGHAM.—Infirmary in connection with St. Edward's Roman Catholic Home (£1,000). Father Hinson, hon. secretary to the Birmingham R.C. Diocesan Society.

BIRSTALL (YORKS.).—Preceptory for Father Russell; 16 houses for the Co-operative Society.

BISHOP STORTFORD.—New Roman Catholic School. Rev. R. Rossall.

BLACKBURN.—People's Palace at Blakey Moor, under consideration. Town Council.
New offices for the Power Loom Overlookers' Association (£5,000).
Proposed Workshops for the Blind. Alderman H. Harrison, Blackburn.

BLETCHINGLEY (SURREY).—Additions, alterations, &c., to Surrey County School. G. E. Everitt, builder, 79, Windmill Road, Croydon.

BOGNOR.—New Church, "St. Wilfrid" (£10,000). C. H. Fellowes-Prynne, architect; J. Jarvis & Sons, builders.

BOLTON.—New Baths for Astley Bridge district. Borough engineer, Town Hall, Bolton.

BOOTHSTOWN (near MANCHESTER).—Two houses in Chaddock Lane. Prescott and Clare.

BOSTON.—New schools in Carlton Road for the Education Committee. G. E. Clarke, borough surveyor, Municipal Buildings, Boston.

BOURNEMOUTH (SPRINGBOURNE).—Reconstruction of the Springbourne Infants' School. Borough engineer.

BRISTOL.—Chapel at Stapleton Workhouse. J. J. Simpson, Clerk to the Guardians, St. Peter's Hospital, Bristol.
(KEYNSHAM).—Extension of station buildings for the Great Western Railway. G. K. Mills, secretary, Paddington Station, G.W.R., London, W.

BROMBOROUGH (near PORT SUNLIGHT).—Chemical works. Robert Neill and Sons, builders, Broughton Lane, Manchester.

BURNHAM (SOMERSET).—House, Rectory Road, for Mrs. H. S. Pitts.

BURNLEY.—Probable rebuilding of works for Greenhalgh, Ltd., dyers.

BURRY PORT (CARMARTHENSHIRE).—Shop and stores in Station Road for the Burry Port Co-operative Society, Ltd. Secretary, Co-operative Society's Offices, Station Road, Burry Port.

BURY.—Additions to mill at Freetown for J. K. Schofield & Co.

CAMBRIDGE.—New school for girls for the Cambridge County Education Committee; Wm. Bell & Son, builders, 2, Downing Street. Repairs to the Round Church; Wm. Bell & Son, builders, 2, Downing Street.

CANNOCK (STAFFS.).—New store-room, alterations to premises for nurses' quarters, and additions to the Union Offices. A. Veall, architect, 84, Darlington Street, Wolverhampton.

CANTERBURY.—Two houses, St. Augustine's Road, Barton Fields, Canterbury. Clarke & Epps, builders, Maidstone.

CARDIFF.—Proposed technical blocks at the Canton Secondary School (£4,150). C. James, architect, Charles Street Chambers, Cardiff.

CARLISLE.—Extension of Cumberland Infirmary, including new electro-medical department (£26,000). J. J. Burnett, architect, 239, St. Vincent Street, Glasgow.

CARMARTHEN.—Chapel in connection with Carmay Congregational Church.

CARRON (ABERDEENSHIRE).—Proposed public hall. Mr. Blair, secretary of Committee, Carron.

CARSHALTON.—Special subjects centre for Surrey C.C. (£1,236); J. T. Hawkins & Co., builders. Houses, Mayfield Road, for W. H. Gibson; Lavender Road, for L. Stafford; Gordon Road, for F. Johnson.

CASTLETOWN (SCOTLAND).—Church at Castletown, Olrig. Sinclare Macdonald, architect, Thurso.

CHARLEVILLE.—Alterations and additions to licensed premises in Main Street for Miss M. Barry. M. A. Hennessy, architect, 74, South Mall, Cork.

CHELFORD (CHESHIRE).—Parish hall.

CHELTENHAM.—Conversion of Victoria Rooms into Palace of Varieties, E. B. Shenton, Cheltenham.

CHESTERTON (CAMBS.).—Houses, Springfield Road, for S. J. Woollard; Aylestone Road, for H. C. Buttress.

CHICHESTER.—Proposed electric light installation at the workhouse for the B. of G.

COLWYN BAY.—First portion of St. Paul's Mission Church. Porter & Elcock, architects, The Estate Office, Colwyn Bay.

COWES.—House, Baring Road, for A. E. Marwin, jun.

CREWE.—Additions to the Cottage Hospital; G. E. Bolshaw, architect, 2, Mill Street, Crewe. Proposed new police station; Borough engineer, Crewe.

CROYDON.—House, Foxley Lane, Beddington; and motor house, Furze Lane, Beddington. Southern Building Co., builders.

CUDWORTH.—Ten houses and shop, Syndale Lane, for H. J. Dwight; six houses, Bloemfontein Street, for Mr. Hutchinson; six houses, Bloemfontein Street, for C. Ogden.

CWM (MON.).—Railway goods shed. G. K. Mills, secretary, Paddington Station, G.W.R., London, W.

DARTFORD.—Eleven houses, Nelson Road. Dann & Lucas, surveyors, 23, Budge Row, E.C.

DAVIST.—New wing to house at Bilbo, Mounie, Davist. Burnett & Reid, 12, Golden Square, Aberdeen.

DEFYNNOCK (BRECON).—Rebuilding police station. C. W. Best, County surveyor, Brecon.

DERBY.—New children's ward block at Derbyshire Royal Infirmary. E. Forster, superintendent and secretary.

DESFORD.—Elementary school. Surveyor of Schools, 33, Bowling Green Street, Leicester.

DEWSBURY.—Six houses, Wakefield Road; Barton & Son, architects, Dewsbury. Extension of the textile department of the Technical School under consideration by the Governors. Houses at Hightown; E. V. King, architect, 24, Westgate, Dewsbury. Houses at Earlsheaton; Kirk & Sons, architects, Dewsbury.

DOVER.—Addition to No. 1, Effingham Lawn; J. Duthoit, 6, Claremont Place. Extension to Buckland Paper Mills for Wiggins, Teape & Co., Dover. Rebuilding premises, 9, Cannon Street, for Boots, Ltd., chemists.

DRIFFIELD (YORKS.).—Farmhouse at Cottam, for the executors of the late Geo. Robson. Tennant & Collins, architects, Pontefract.

DUBLIN.—Prospective re-erection, after fire, of the premises of Morgan, Mooney & Co., Ltd., chemical manufacturers, Rogerson's Quay.

DUNDEE.—Additions to warehouses in Dundonald Street for F. S. Sandeman and Sons, manufacturers. Alterations and additions to house for Dundee and Arbroath Joint Railway; the secretary, Dundee. Extension of works in Lochee Road for A. P. Mathewson & Co., manufacturers. Additions to house at 14, Albany Terrace, for Thomas Shaw. Houses and workshop for J. A. Jobson, Small's Wynd.

DUNSTABLE.—Houses, Waterlow Road, for B. Timms.

DURHAM.—Houses, Low Pittington, for Robert Murray; Anton Stile, for Henry Meredith; Bowburn, for Geo. Brass; Bowburn, for Bell Bros., Ltd.; house and shop, Coxhoe, for Alexander Jamieson; alterations and additions to the Wheat Sheaf Hotel, Bowburn, for the Trustees of Bishop Middleham Brewery Co., Ltd.

EASINGTON (CO. DURHAM).—Houses, Seaham Colliery, for Mr. Kirton; Station Town, for Mrs. Chas. Lee; Cookson Estate, for T. Dobson; Dalton-le-Dale, for F. R. Gregson.

EAST GRINSTEAD.—New Council school at Ashurst Wood (£3,840). Alterations to East Grinstead Court House (£800).

EASTLEIGH (HANTS).—Thirteen houses, Archer's Road, for L. W. Bushell.

ELGIN (DUFFUS).—Additions and alterations, at Hopeman Public School, for the Duffus School Board. D. J. Corrigall, architect, Keith.

ELLAND.—New mill, for James Fielding & Co., cotton doublers. Walsh and Nicholas, architects, Museum Buildings, Halifax.

ELLON.—Proposed extension of Burgh School. R. Gordon, chairman of School Board, Ellon, Abeerdeenshire.

ELTHAM.—Residence. Hodgkinson & Son, architects, 22, Wellington Street, Strand, W.C.

ENFIELD.—Secondary school and institute (£12,400). Treasure & Son, builders, Holloway, N.

EPSOM.—Nurses' home; also additions and alterations to workhouse. A. C. Williams, architect, 14, Great James Street, Bedford Row, W.C.

FERMOY.—Business premises. A. Hill, architect, 22, George's Street, Cork.

FERRYHILL (CO. DURHAM).—Alterations and improvements at the Hall, for the Parish Council. R. Willey, Clerk to the Council, Ferryhill Village.

FLEETWOOD.—Proposed extension of Cottage Hospital.

GRANGEMOUTH.—New office at soap works, for Co-operative Wholesale Society. The Manager, Co-operative Wholesale Society, Grangemouth.

GRAYS.—School at Aveley, for the Orsett District Education Sub-Committee. C. M. Shiner, architect, 10, John Street, Adelphi, London, W.C.

GREAT CROSBY (near LIVERPOOL).—Houses, Hall Road West, for Costain and Son; Cook's Lane, for John Johnson; Victoria Road, for J. Sutch.

GREENOCK.—Admiralty torpedo factory. R. Neill & Sons, builders, Broughton Lane, Manchester.

GUILDFORD.—New Schools at Artington, for Surrey C.C. (£1,521). Mitchell Bros., builders, Shalford, Guildford.

HALIFAX.—Block of semi-detached houses, Trimmingham Lane. G. Buckley and Son, architects, Tower Chambers, Halifax.

HANLEY.—New Mission Church at Sneyd Green. Rev. J. W. Alston, vicar of Christ Church, Cobridge, Staffs.

HARBRO' HILLS (near BARNSLEY).—Probable colliery developments. Mr. Broadhead.

HARROGATE.—Houses, Kent Road, for D. Simpson, builder; Trewit Well Road, for Isaac Pickard; Birch Grove, for D. Saynor; Cavendish Street, for J. Croston; 63, Dragon Avenue, for Richard Annakin, builder, 7, Dragon Avenue; Trewit Well Road, for G. Brown. Alterations to premises, Station Bridge, for R. T. Hodgson, ironmonger.

HECKMONDWIKE.—Extension of the Primitive Methodist Church.

HENLEY-ON-THAMES.—Extensions to the Workhouse, for the Board of Guardians. T. Neighbour, chairman of the Board of Guardians.

HIGH WYCOMBE.—Houses, Desborough Park Road, for W. Joynson; shop, Church Street, for H. J. Cox; additions to factory, for V. M. Millbourn, West End Road; business premises, Church Street, for Lipton, Ltd.

HINDLEY (LANCS.).—Frederick Street School to be converted into a Central Hall for cinematograph entertainments, electrically equipped, for the proprietor of the "World in Motion," Leigh, Lancs.

HITCHIN.—Houses, Ickleford Road, for J. Knight; Bearton Road, for A. Bridges. Conversion of Temperance Hotel into shops, for W. B. Moss & Sons, warehousemen.

HORBURY (near WAKEFIELD).—Minister's house. G. F. Andrassy, Queen Street, Horbury.

HORLAKE (CHESHIRE).—Villa residence in Cromer Road. Jas. Seddon, builder, Curzon Road.

HORSHAM.—New Mission Hall at Broadbridge Heath. Alterations and additions to Itchingfield Council School; H. P. Roberts, architect, County Education Offices, Horsham.

HYDE (CHESHIRE).—New Waterworks (£11,000). Borough Engineer, Town Hall, Hyde.

ILFORD.—Church, Baxter Road; E. T. Dunn, architect, 7, Roding Street, Ilford. Nine houses, Aden Road; F. B. Harrison, builder. 166, Balfour Road, Ilford. Additions to laundry, Ley Street; B. Bailey & Co., surveyors, 21, Ironmonger Lane, E.C. Additions to houses, Buckland Road; A. R. Upsdale, surveyor, 738, Romford Lane, Ilford. Five houses, Benton Road, for C. G. Shirling, Stratford, E.

INCE (LANCS.).—New spinning mill, for the Empress Spinning Co., Ltd. (50,000 spindles). J. Parkinson & Sons, builders, Blackpool.

INVERNESS.—Boat shelter at harbour, to cost £10,000. J. Fraser, C.E., Harbour engineer, Inverness.

IPSWICH.—St. Nicholas parish room. Brown & Burgess, architects, Arcade Street, Ipswich.

KENDAL.—Extensions to Stramongate Hall. S. Shaw, architect, 45, Highgate, Kendal.

KENNETHMONT (ABERDEENSHIRE).—Proposed public hall.

KETTERING.—Additions to premises, York Road, for E. Watts. Sharman and Archer, architects, Wellingborough.

KIRKCALDY.—Extension of high school. W. Williamson, architect, Kirkcaldy. Alterations to the Corn Exchange.

KNARESBOROUGH (YORKS.).—Proposed secondary school.

LEEDSTOWN (CORNWALL).—New Wesleyan Sunday School. R. H. Mitchell, secretary to Building Committee.

LEICESTER.—Additions to the Technical and Art Schools for the T.C. (£14,000).

(IBSTOCK).—Extension of the Baptist Chapel and Sunday Schools (£1,000). Goddard and Wain, architects, Coalville; Griffin Bros., builders, Hugglescote.

LINCOLN.—Additions to St. Nicholas' Church. C. Hodgson Fowler, architect, The College, Durham.

LONDON (EUSTON ROAD, N.W.).—Shops, &c., on site of Nos. 45-113, for Skinners Co. W. C. Jones, architect, 32, Bedford Row, W.C.

(STRAND, W.C.).—Alterations and additions to St. Clement Danes Vestry Hall (£700). J. Murray, architect, 11, Suffolk Street, Pall Mall East, S.W.

(BOND STREET, W.).—Rebuilding business premises. W. Cubitt and Co., builders, 258, Gray's Inn Road, W.C.

(CHELSEA, S.W.).—Working-class dwellings in Manor Street for the Borough Council (£21,000). Borough surveyor, Town Hall, King's Road, Chelsea, S.W.

(NEW CROSS, S.E.).—Alterations to "The Arrows" public-house. McKilliam and Procter, architects, 33, St. Paul's Churchyard, E.C.

(CLAPHAM, S.W.).—Shops in Clapham Road and Union Road. J. Mayo, 2, Union Road, Clapham, S.W., builder.

(WALTHAMSTOW, E.).—Shops at Hoe Street and Highams Park stations; Architects' Department, Great Eastern Railway Co., Liverpool Street, E.C. Fire brigade station; G. W. Holmes, engineer, Urban District Council, Town Hall, Walthamstow.

(WOOLWICH, S.E.).—Additions to "The Burrage Arms" public house. T. Glanfield, 370, Evelyn Street, Deptford, S.E.

(HENDON, N.W.).—Two houses, Park Avenue; W. J. King, builder, North End Road, N.W. Twenty-two houses, Dartmouth Road; H. Shaw, architect, 6, Nicoll Road, Willesden. Two houses, Ravenscroft Avenue; R. Vernon Hart, builder, Burgess Hill, Hampstead. New road for Ecclesiastical Commissioners; Carée and Passmore, architects, 8A, Whitehall Place, S.W.

(HOLBORN).—Buildings in Baldwin's Place for Willmott & Sons, machine rulers, 55, Bartholomew Close, E.C.

(ROTHERHITHE, S.E.).—Buildings in Oxley Street. Stock, Page and Stock, architects, 9, Denman Street, S.E.

(HAMPSTEAD, N.W.).—Churches for Garden City. E. L. Lutyens, architect, 29, Bloomsbury Square, W.C.

(NORTH END ROAD, N.W.).—Nine shops. A. W. Cleaver, architect, 54-5, London Wall, E.C.

(GOLDER'S GREEN, N.W.).—Ten shops. J. Gibb, builder, Golder's Green Road, N.W. Two houses; Saber & Son, builders, 1 and 3, St. Peter's Street, Islington.

(WOODSTOCK ROAD, N.W.).—Motor garage. J. Gibb, jun., builder, Golder's Green Road, N.W.

(KINGSWAY, W.C.).—Shops and offices, corner of Vernon Place (in course of completion). Grant, Taylor and Atkinson, 39, Bloomsbury Square, W.C., surveyors.

(FULHAM, S.W.).—Motor garage in Seagrave Road. A. F. Vigers, architect, 4, Fredericks Place, Old Jewry, E.C.

(CHELSEA, S.W.).—Additions to premises in Sloane Street. Hudson and Hunt, architects, 24, York Place, Portman Square, W.

(KENNINGTON, S.E.).—Three blocks of buildings in Upper Kennington Lane. Hayward and Maynard, architects, 14, John Street, Adelphi, W.C.

(HOLLOWAY, N.).—Building in Hornsey Road. Sprosson & Babb, builders, Hornsey Rise, N.

(LISSON GROVE, N.W.).—Hospital for Invalid Gentlemen. C. W. Ferrier, architect, 11, Waterloo Place, S.W.

(HAMPSTEAD ROAD, N.W.).—Shops. Bartlett & Ross, architects, 8, Bream's Buildings, W.C.

(ACTON, W.).—Proposed additions to hospital. W. Hodson, clerk to U.D.C.

(DEPTFORD).—Central public library and two branch libraries. G. W. Preston, town clerk.

(HAMPSTEAD, N.W.).—Church rooms (£3,000) in connection with St. Stephen's (Rev. H. N. Bate, vicar).

(S.E.).—Electric lighting extension to Borough Polytechnic Institute. W. M. Richardson, secretary.

(HAMMERSMITH, W.).—Refreshment saloon for Lyric Opera House. F. Matcham & Co., architects, 9, Warwick Court, W.C.

(ST. MARTIN'S LANE, W.C.).—Block of dressing rooms, &c., at New Theatre. W. G. R. Sprague, architect, 10, Jermyn Street, W.

(STRAND, W.C.).—Cinematograph chamber, Tivoli Music Hall. Wylson & Long, architects, 16, King William Street, W.C.

(ROTHERHITHE, S.E.).—Buildings for H. J. Enthoven & Sons, Ltd., 153-155, Leadenhall Street, E.C.

LONGFORD (COVENTRY).—Proposed L.N.W. Railway goods station.

LUTON.—New vicarage, London Road, for Rev. T. Bulman, 8, Union Street; factory, Gordon Street, for J. Hill; houses, Kenilworth Road and Westbourne Road, C. H. White, builder, 72, Dunstable Road; Ashburnham Road, for Hill Bros.; Reginald Street, F. Chandler, builder, 78, Cromwell Road; Clipston Road, for E. Hillyard; Dunstable Road, for S. W. Johnson; West Hill Road, for R. Jones; Naseby Road, for W. Mardle; Chatsworth Road, G. W. Pryer, builder, Downs Road; West Hill Road, for W. H. Guest Hubbard; Round Green, A. Mardle, builder, 18, Cowper Street; parish room, Shaftesbury Road, for Rev. B. H. Winterbotham; rebuilding Rabbit Inn, for J. W. Green, Ltd., brewers, Park Street West.

LYNTON.—Monastery. B. Jones, Lynton.

MAIDSTONE.—Proposed infectious diseases hospital, near Loose. Houses, Old Tovil Road; Clarke & Epps, builders, Cornwallis Road. Pope Street, for T. G. Large.

MARKET HARBOROUGH.—Secondary school. Coales & Johnson, Bank Chambers, Market Harborough.

MELTON MOWBRAY.—Secondary school. E. Shelbourn, Melton Mowbray.

MERTHYR TYDFIL.—New free library at Treharris. T. F. Harvey, borough engineer, Town Hall, Merthyr Tydfil.

MIDDLESBROUGH.—New Wesleyan Methodist Church at Grangetown.

(ORMESBY).—Alterations to the U.D.C. Offices, High Street, North Ormesby. W. G. Harrison, surveyor, Council Offices, High Street, North Ormesby.

MILLBROOK (CLONES).—Five new houses.

MOSLEY COMMON (near MANCHESTER).—Two houses for J. T. Smith.

MULLINGAR.—Operation ward at the Westmeath Infirmary. E. Joyce, County Surveyor, Mullingar.

NANTWICH.—Alterations and extensions to Congregational Schools, Monk's Lane; alterations to residence, Wellington Road, for Mr. Farmer; alterations to White Lion Inn.

NEATH.—Intermediate school. L. J. Kempthorne, Duffryn Chambers, Neath.

NEWBOROUGH (ANGLESEY).—Houses for Capt. H. Evans. H. Thomas, architect, Castle Buildings, Carnarvon.

NEW MALDEN (SURREY).—Three houses. A. Cole, architect, "Mogok," Thurlestone Road, West Norwood, S.E.

NEW MILLS (DERBYSHIRE).—New Wesleyan Church (£2,000). Trustees.

NEWPORT (ISLE OF WIGHT).—Business premises, Upper St. James's Street, for Jordan & Stanley, grocers.

NOTTINGHAM.—Extension or rebuilding of Westhouses Primitive Methodist Schools.

ORRELL (LANCS.).—Houses, Moor Road, for Reginald Lyon; Smith's Road, for P. Lathom.

PARTINGTON (near MANCHESTER).—New Wesleyan Sunday Schools. W. Campbell, architect, Manchester; Brew Bros., builders, Cadishead, Manchester.

PLYMOUTH.—Premises, Courtenay Street, for the Co-operative Society. Extensive alterations to business premises, Bedford Street, for Browse & Co.

PONTYPRIDD.—Twenty-one houses at Church Village, Llantwit Vardre. A. L. Thomas, architect, Church Street Chambers, Pontypridd.

PUDSEY.—Presbytery in The Lanes for St. Joseph's R.C. Church.

RADCLIFFE (LANCS.).—Seven houses in Ainsworth Road for the Radcliffe and Pilkington Co-operative Society, Ltd., Sion Street, Radcliffe. New Public Offices for the U.D.C. (£13,500). Gillow & Holt, architects.

REIGATE.—Houses, Waterhouse Lane, Kingswood, for Densham & Berry, Kingston Station; and Peter Riddock, "Fonthill," Reigate Road, Reigate Park Road, Smallfield, Burstow, for E. E. Mitchell, builder, 51, Lumley Road, Horley.

ROMFORD.—Additions to Workhouse. H. Harrington, architect, 65, Bishopsgate Street Without, E.C.

ROSCREA.—Alterations and additions to the Post Office. H. Williams, secretary, Office of Public Works, Dublin.

ROTHERHAM.—Extension and alteration of premises in the Labour Test Yard for the Guardians. D. B. Jenkinson, architect, Imperial Buildings, Rotherham. Alterations and additions to the Grammar School for the Governors. S. Hey, Education Offices, Town Hall, Rotherham. New church at Catcliffe.

RUNCORN.—Shop and houses, Sandy Lane, for the Runcorn and Widnes Co-operative Society.

ST. LEONARDS-ON-SEA.—Large villa residence in Filsham Road; Boniface and Elworthy, architects, St. Leonards. Additions to Lawnhurst, Hollington Park, for J. Dimsdale; Murray, Delves & Murray, architects. New assembly room at rear of 32, Norman Road, for Farmer & Carpenter; Pigott & Oxley, architects, Saxon Chambers, St. Leonards. Additions to Nos. 50 and 51, Marina, for the Trustees of Goodwin's Estate; H. Ward, architect, Bank Buildings, Hastings.

SCORRIER (CORNWALL).—Rebuilding Scorrier House for J. Williams. B. C. Andrew, architect, Biddick's Court, St. Austell.

SCUNTHORPE (LINCS.).—Mission Church at Crosby (£200).

SENGHENYDD (near CARDIFF).—Congregational Chapel; J. H. Phillips, architect, Clive Chambers, Windsor Terrace, Cardiff. Public hall (seat 1,000) with gymnasium and library and institute; W. B. Rees, architect, 3, Dumfries Place, Cardiff.

SHAW (LANCS.).—Shops and bakery, in Milnrow Road, for the Crompton Co-operative Society, Ltd.; J. H. Mills, architect, 9, Oak Street, Shaw. Houses, Chamber Road, for Thos. Milne; George Street, for J. E. Buckley.

SMETHWICK.—Houses, Great Arthur Street, for J. W. J. Kingstone; St. Alban's Road, for G. A. Hill; warehouse, 685, Bearwood Road, for Messrs. Faulkner.

SOUTHEND-ON-SEA.—Conversion of four houses into shops, Leigh Road, for Watson & Temple; houses, Leigh Road, for S. Barnett; Cliff Road, for Mrs. Burton; Leigh Road West, for A. E. Day; South Avenue, for A. O. Moore; Shakespeare Drive, for Mrs. Neal; South View Drive, for W. L. Knight; Imperial Avenue, for Dr. P. S. Jakins; Leigh Cliff Road, for W. H. Ridgley; South Avenue, for W. Goldsworthy; Leigh Road East, for J. Bane; North Avenue, for W. Robinson; Glen Road, for S. F. Johnson; shops, Victoria Avenue, for F. F. Ramuz; motor house, Laurence House, Valkyrie Road, for Dr. T. Brice Poole.

SOUTHSEA.—Proposed Congregational Church (£3,500). Rev. G. F. Williams, pastor, Victoria Road Church, Southsea.

SOUTH SHIELDS.—Two semi-detached villas for J. T. Atkin; J. H. Morton, architect, King Street, South Shields. Premises in King Street, for the North-Eastern Banking Co., Ltd.; J. H. Morton, architect, 50, King Street, South Shields.

STANTON-UNDER-BARDON (near LEICESTER).—New Church. Toone and Warrington, builders, Anstey.

STOKE-ON-TRENT.—Alterations and additions at the Workhouse; A. R. P. Piercy, architect to the Guardians, Union Offices, Stoke-on-Trent. Conversion of buildings in Wolfe Street into suites of offices; R. T. Longden, architect, Market Place, Burslem. New Wesleyan Church at The Mount; Ford & Slater, architects, Stoke.

TAMWORTH.—Probable erection of a model lodging-house. Town Council.

THORNLEY (Co. DURHAM).—Residence for Dr. Ryan, and nine houses for Nixon Bros., at Wheatley Hill.

THURSO.—New Church at Bettyhill, Farr. S. Macdonald, architect, Thurso.

TODMORDEN.—Electric light to be installed at the new Hippodrome. R. Dewhirst, manager.

TREGARON (CARDIGANSHIRE).—New chapel (£920). D. L. Jones, builder, Esgertendy, Tregaron.

TREHERBET.—Extension of Baptist Chapel. W. D. Morgan, architect, 194, Ystrad Road, Pentre.

TWICKENHAM.—Four houses, Fifth Cross Road. G. N. Street, builder, Lebanon Park, East Twickenham. Additions to laundry, Cambridge Park House. Leslie & Co., Ltd., builders, Kensington Square, W.

WAKEFIELD.—Twenty-seven houses for the Crigglestone Collieries, Ltd.

WALKDEN.—Structural alterations contemplated at St. Paul's School. Extensions to dye houses at Hope Mills; L. Lane & Sons.

WALLASEY.—Additions, including new café, to the New Brighton Pier Vaults.

WALLINGTON (SURREY).—Houses, Blenheim Gardens, for J. Beavan.

WALSALL.—Proposed institute at Chase Terrace.

WATFORD.—Houses, Monmouth Road, for H. Young; Sydney Road, for S. Swain; Hampstead Road, for F. H. Gorle; Whippendell Road, for T. Callam; King Edward Road, for Mr. Wright; Cambridge Road, for Andrews & Son; Monmouth Estate, W. King, builder, 41, Market Street; Pinner Road, for J. & G. Waterman, builders, 103, High Street; bungalow, Field Road, for Mr. Wright; additions to convent, Percy Road, for St. Vincent's Convent; shops and offices, Chalk Hill, for J. Rodwell; Metal Work Centre, for Herts C.C.; Palace of Varieties, Clarendon Road, for the Watford Hippodrome Co., Ltd.

WELLINGTON (SALOP).—Proposed secondary school in King Street, H. Smith, Chairman of the Salop Education Authority, Shrewsbury.

WEMBLEY.—Proposed rebuilding of St. James' Church, Alperton.

WESTBURY (WILTS.).—House at Westbury Leigh, for Mr. Alley.

WEST DRAYTON.—Baptist Church. Rev. E. W. Stenlake, pastor.

WEST KIRBY.—Extension of St. Andrew's Church, Meol's Drive. Wm. H. Forde, Ltd., contractors, Birkenhead.

WHITBY.—Harbour improvement works for the U.D.C. (£59,344). J. W. Sandeman and Son, engineers, Newcastle-on-Tyne; Hill & Co., contractors, London.

WICK.—New Manse at Lybster. Sinclair Macdonald, architect, Thurso.

WIGAN.—Alterations and additions to Clarence Hotel, for Councillor Ross.

WINDSOR.—Extensions for the Co-operative Society.

WOLVERHAMPTON.—Proposed new works to be established by Wm. Robinson, The Hollies, Penn Fields.

WOMBWELL (YORKS.).—Houses, Park Street, for Johnson & Taylor; Hough Lane, for F. Lambert; Broomhill, for Mrs. P. Greenwood; Everill Gate Lane for Samuel Moody; Cemetery Road, Hemingfield, for Adam Taylor.

WOOLACOMBE (DEVON).—Proposed new church.

WORCESTER (MARTLEY).—Restoration of the Parish Church (£2,000). J. F. Hastings, Rector.

WORKSOP.—Houses, Waterworks Road, for Mrs. Drabble; Watson Road, for G. Beech.

FORTHCOMING EVENT.

Saturday, August 1st.—At 2 p.m. At the Wood Memorial Hall, Newcastle-on-Tyne. North of England Institute of Mining and Mechanical Engineers. Annual general meeting.

NOTES.

Consulting Engineers.—An article signed "K" in the current number of the *Electrotechnischer Anzeiger* deals exhaustively with the rules laid down by the Institution of Electrical Engineers with regard to consulting engineers. While agreeing in the main, the writer makes some pertinent remarks on Rules 2 and 3 dealing with advertising and the answering of advertisments. He says:—"The big consulting engineer, who is known by everybody without the need of advertisement, can easily comply with these rules, but less known men, if they respect themselves, fare badly and lose much business, which goes to the former. The rule may be good in itself, but the worst is that the Institution has no power to compel anyone to adhere to it. Anyhow, if advertising is to be prohibited, it ought to be left to the individual choice of anyone, whether he cares to answer advertisements or not. If too much is demanded and the conditions are too rigorous, nothing at all will be effective. The consulting engineer is not in the same position as the medical man, who forms a distinct class, and who cannot be a maker of chirurgical instruments to-day and a practitioner to-morrow, and any regulations which tend to take the bread out of the mouth of a decent and conscientious man and give it to the one whose conscience is more elastic are pernicious, and that is surely the case in the long run as far as the rules of the Institution are concerned." The journal adds that really only Rules 4 and 5, which deal with secret commissions, matter, and these have also been adopted by the Berlin Association of Consulting Electrical Engineers.

Appointments Vacant.—EASTBOURNE.—Charge engineer (£104) for the T.C. electricity works.

PLYMOUTH.—The Secondary Education Sub-Committee of the Plymouth Education Authority requires a visiting lecturer in electrical engineering at the technical school.

BERMONDSEY.—Engineer-in-charge (£110) for the Corporation electricity works.

Territorial Electrical Engineers.—Arrangements have been made for the annual camp of the West Lancashire Telegraph Engineers (Territorials), late the Mersey Electrical (Volunteer) Royal Engineers, to be held at Ruthin, North Wales. The battalion will accordingly parade at headquarters in Liverpool on Sunday morning, and proceed to camp for a fortnight's training under Lieut.-Colonel S. W. Doyle, V.D., commanding.

Educational Notes.—IMPERIAL COLLEGE OF SCIENCE AND TECHNOLOGY.—The Royal Commissioners of the Exhibition of 1851 have appropriated the whole of the remaining site of their estate at South Kensington for the purposes of the Imperial College. New mining and metallurgical buildings are to be provided for the Royal School of Mines. The Hon. R. J. Strutt, F.R.S., has been appointed additional professor of physics.

NORTHAMPTON POLYTECHNIC INSTITUTE.—The day courses in Mechanical and Electrical Engineering commence on October 5th; they extend over four years, and prepare for the B.Sc. degree. Technical Optics is a subject to which the Institute devotes special attention.

CITY AND GUILDS OF LONDON INSTITUTE.—The diploma of "Associate" has been awarded to 91 matriculated third-year students of the Central Technical College, who have completed a full course of instruction. Of these, 58 were students in Civil and Mechanical Engineering, and 26 in Electrical Engineering. The Bramwell Medal in the former was awarded to F. H. Bramwell, and the Siemens Memorial Medal and Premium in Electrical Engineering to R. E. Neale. In addition to the above, Certificates have been awarded to 25 matriculated third-year students who have completed a full course of instruction at the Central Technical College, and to 62 students who have completed a full course of instruction at the Technical College, Finsbury.

UNIVERSITY COLLEGE.—A new Lectureship in Electrical Design has been instituted, and Mr. H. M. Hobart has been appointed thereto. The new laboratories and extensions of the Departments of the Faculty of Engineering, which were opened by the Chancellor, Lord Rosebery, last March, will be further equipped during the present Long Vacation with a new boiler, a steam turbine, hydraulic apparatus, and equipment for research in metallography and radiotelegraphy,

Institution Notes.—LIVERPOOL AND DISTRICT ELECTRICAL ASSOCIATION.—The annual general meeting was held on Tuesday last, the chair being taken by Mr. J. J. Richardson. The report and balance-sheet for the past 12 months was presented by Mr. S. Frith, showing a satisfactory balance carried forward. The election of the officers, &c., for the present

year was then proceeded with, when the following gentlemen were elected:—President, Mr. H. E. O'Brien, Formby; Vice-Presidents, Mr. J. A. Crowther, Liscard, and Mr. C. W. Mallins, Liverpool. Members of Council, Messrs. H. W. Brooks, J. Greenhalgh, W. H. Hamilton, R. A. Lambert, C. I. Moore, J. Maxwell, and J. J. Richardson. Mr. Samuel Frith, 77, St. John's Road, Bootle, is the Hon. Secretary and Treasurer, assisted by Mr. J. T. Stanbury, Litherland.

ASSOCIATED MUNICIPAL ELECTRICAL ENGINEERS (GREATER LONDON).—The annual general meeting of this association was held on Friday last, when the following officers were elected for the ensuing year:—President: C. Newton Russell, Shoreditch. Vice-Presidents: G. G. Bell, Hammersmith; W. C. P. Tapper, Stepney; W. C. Ullman, East Ham. Treasurer: G. G. Bell, Hammersmith. Auditors: A. J. Fuller, Fulham; P. E. Rycroft, Heston. Hon. Secretary: A. H. Shaw, Ilford. Council: S. W. Baynes, St. Pancras; J. R. J. Bowden, Hackney; A. C. Cramb, Croydon; C. S. Davidson, Mortlake; A. Gay, Holloway; A. C. Gilling, Epsom; C. F. McInnes, Gravesend; L. L. Robinson, Hackney; E. Sayer, Hampstead; A. H. Seabrook, West Ham; N. Staniland, Hornsey; J. E. Tapper, Beckenham.

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Central Station Engineers.—MR. TOM DUNCKLEY, a member of the staff at the Kilmarnock T.C. electric station, was last week entertained by colleagues and friends and presented with a dressing-case, on the occasion of his leaving for England.

The Luton T.C. has increased the salary of the electrical engineer, MR. W. H. COOKE, from £300 to £350 per annum.

MR. P. F. ROBERTS, of the Kettering electricity staff, who has secured an appointment at the Kilmarnock municipal electricity works, has been presented by the station staff and employés at Kettering with a dressing-case.

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Brown-Mackenzie Signal Co., Ltd. (3,335).—This company was registered in Dublin on July 3rd, with a capital of £1.000 in £1 shares, to acquire certain British patents for improvements in electric signalling on railways, and also any patent granted in any other country with respect to the same invention. The subscribers (with one share each) are:—G. H. Brown, 14, Dublin Road, Belfast, merchant; W. J. Mackenzie, Marlborough Park, Belfast, laundry manager; W. R. McMurray, 14, Dublin Road, Belfast, merchant; H. Brown, jun., 14, Dublin Road, Belfast, merchant. Private company. The first directors are G. H. Brown, W. R. McMurray and H. Brown, jun. Registered office, 1, Marcus Ward Street, Belfast.

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Norfolk Electrical Co., Ltd. (98,700).—This company was registered on July 6th with a capital of £2,000 in £1 shares, to acquire the business carried on in Birmingham as the Norfolk Electrical Co., and to carry on the business of dealers in electrical goods and appliances connected with the application of electricity for lighting, heating, motive power or otherwise, &c. Private company, with two subscribers, viz., G. W. Holt, Norfolk House, Cannon Street, Birmingham, merchant; and J. A. Dale, 12, Bennett's Hill, Birmingham, solicitor, each taking one share. The number of directors is not to be less than two or more than five; the subscribers are to appoint the first. Remuneration as fixed by the company. Registered office, Norfolk House, Cannon Street, Birmingham.

Mallinson Brothers (1908), Ltd. (98,793).—This company was registered on July 11th, with a capital of £500 in £1 shares, to carry on the business of tool makers, ironfounders, mechanical and electrical engineers and manufacturers of dynamos, motors, carriages, vehicles and engines, and to acquire the business carried on at Mytholm Foundry, Hipperholme, Yorks, as Mallinson Brothers, and to adopt an agreement with J. Mallinson and W. Mallinson. Private company, with only two subscribers—viz.: J. Mallinson and W. Mallinson, machine tool makers, of 15, Waverley Terrace, Hipperholme, taking one share each. The number of directors is not to be less than two or more than five; the first are J. Mallinson and W. Mallinson, and each may retain office while holding £50 shares.

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Dey Time Registers, Ltd. (98,801).—This company was registered on July 13th, with a capital of £50.000 in £1 shares (15,000 6 per cent. cumulative preference), to take over the business carried on at Liverpool, London, Glasgow, Paris, Brussels, or elsewhere, as patentees, inventors, and manufacturers of, and dealers in time recorders, tell-tale and other clocks and watches, time stamps, horological instruments, slips, sheets, cards, disks, crates, boxes and cases and other articles and mechanism, as "Howard Bros.," and to adopt an agreement with F. M. Howard, W. R. Howard, E. S. Howard, and W. T. Jolliffe, and to carry on the said business, and that of electrical engineers and contractors, suppliers of electricity, synchronisers of clocks and timepieces, manufacturers of and dealers in railway, tramway, electric, magnetic, galvanic, and other apparatus, &c. The subscribers (each with one share) are:—F. M. Howard, Ashwood House, Hawarden, Flint, merchant; W. R. Howard, St. Winifreds, Bertram Drive, Meols, Cheshire, merchant; E. S. Howard, 379, Upper Richmond Road, S.W., merchant; W. T. Jolliffe, Mount Alyn, Rossett, Denbigh, gentleman. Private company. The number of directors is not to be less than three or more than seven; the first are F. M. Howard and E. S. Howard (joint managing directors), and W. R. Howard (all permanent, subject to holding 1,000 shares); qualification of ordinary directors, 100 shares; remuneration of joint managing directors, £500 each per annum, and 5 per cent. of the surplus profits in excess of £6,000; of the other directors, £200 per annum. Registered office, 40, Paradise Street, Liverpool.

Coweys, Ltd. (98,833).—This company was registered on July 15th, with a capital of £6,000 in £1 shares, to adopt an agreement with L. E. Cowey, and to carry on the business of electric, hydraulic, mechanical, manufacturing, civil and mining engineers, founders, &c. The subscribers (each with one share) are:—K. Houston, 22, Lancaster Gate, W., solicitor; C. W. Inman, 104, Sternhold Avenue, Streatham Hill, S.W., clerk; E. P. Barrington, 139, Park Road, Kingston-on-Thames, clerk; B. B. Houston, 22, Lancaster Gate, W., articled clerk; W. P. Hunter, 117, Manor Street, Clapham, S.W., clerk; C. Brown, 18, Treherne Road, Brixton, S.W., clerk; E. W. Church, 70, Nightingale Road, Clapton, N.E., law clerk. Private company. The number of directors is not to be less than three or more than five; the subscribers are to appoint the first. Registered office, 39, Victoria Street, Westminster.

Electrical Regulators and Economisers, Ltd. (98,802).—This company was registered on July 13th, with a capital of £2,000 in £1 shares, to acquire and turn to account certain patent rights granted or to be granted to H. S. Martin, of Liverpool, relating to improvements in electric resistance, to make experiments in and exhibitions of applied electricity, magnetism, or similar agencies, &c. The subscribers (each with one share) are:—C. T. Wood, Oak Gables, West Kirby, retired provision merchant; E. H. W. Butterworth, 51, North John Street, Liverpool, director; R. M. Grierson, 22, Lord Street, Liverpool, estate agent; H. S. Martin, 16, Cumberland Street, Liverpool, electrical engineer. Private company. Table "A" mainly applies. Registered office, 51, North John Street, Liverpool.

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Mallinson Brothers (1908), Ltd. (98,793).—This company was registered on July 11th, with a capital of £500 in £1 shares, to carry on the business of tool makers, ironfounders, mechanical and electrical engineers and manufacturers of dynamos, motors, carriages, vehicles and engines, and to acquire the business carried on at Mytholm Foundry, Hipperholme, Yorks, as Mallinson Brothers, and to adopt an agreement with J. Mallinson and W. Mallinson. Private company, with only two subscribers—viz.: J. Mallinson and W. Mallinson, machine tool makers, of 15, Waverley Terrace, Hipperholme, taking one share each. The number of directors is not to be less than two or more than five; the first are J. Mallinson and W. Mallinson, and each may retain office while holding £50 shares.

Balchin, Schulz & Co., Ltd. (98,799).—This company was registered on July 13th, with a capital of £10,000 in £1 shares (7,500 5 per cent. cumulative preference), to adopt an agreement between H. A. Balchin, G. F. Schulz and C. H. Hayward of the first part, H. A. Woodman and F. Coomber of the second part, and the company of the third part, for the acquisition of the businesses (1) carried on by the said H. A. Balchin, G. F. Schulz and C. H. Hayward as "Balchin, Schulz and Co.," at Lennox House, Norfolk Street, W.C., and (2) carried on by the said H. A. Woodman and F. Coomber as "Armitage & Co.," at 27A, Gloucester Street, Queen Square, W.C., and to carry on the business of electrical and mechanical engineers, founders, manufacturers of agricultural implements and other machinery, &c. The subscribers (with one share each) are:—H. A. Balchin, Broadclyst, New Malden, Surrey, chartered secretary; G. F. Schulz, Dereham, Whitehall Road, Thornton Heath, engineer; C. H. Hayward, Neroburg, Ventnor, Isle of Wight; H. A. Woodman, 27A and 27B, Gloucester Street, Queen Square, W.C., engineer; F. Coomber, 27A and 27B, Gloucester Street, Queen Square, W.C., engineer. Private company. The number of directors is not to be less than three or more than seven; the first are H. A. Balchin, G. F. Schulz, C. H. Hayward, H. A. Woodman and F. Coomber (all permanent, subject to holding 200 shares each); qualification of ordinary directors, 100 shares. Registered office, Lennox House, Norfolk Street, Strand, W.C.

Dey Time Registers, Ltd. (98,801).—This company was registered on July 13th, with a capital of £50,000 in £1 shares (15,000 6 per cent. cumulative preference), to take over the business carried on at Liverpool, London, Glasgow, Paris, Brussels, or elsewhere, as patentees, inventors, and manufacturers of, and dealers in time recorders, tell-tale and other clocks and watches, time stamps, horological instruments, slips, sheets, cards, disks, crates, boxes and cases and other articles and mechanism, as "Howard Bros.," and to adopt an agreement with F. M. Howard, W. R. Howard, E. S. Howard, and W. T. Jolliffe, and to carry on the said business, and that of electrical engineers and contractors, suppliers of electricity, synchronisers of clocks and timepieces, manufacturers of and dealers in railway, tramway, electric, magnetic, galvanic, and other apparatus, &c. The subscribers (each with one share) are:—F. M. Howard, Ashwood House, Hawarden, Flint, merchant; W. R. Howard, St. Winifreds, Bertram Drive, Meols, Cheshire, merchant; E. S. Howard, 379, Upper Richmond Road, S.W., merchant; W. T. Jolliffe, Mount Alyn, Rossett, Denbigh, gentleman. Private company. The number of directors is not to be less than three or more than seven; the first are F. M. Howard and E. S. Howard (joint managing directors), and W. R. Howard (all permanent, subject to holding 1,000 shares); qualification of ordinary directors, 100 shares; remuneration of joint managing directors, £500 each per annum, and 5 per cent. of the surplus profits in excess of £6,000; of the other directors, £200 per annum. Registered office, 40, Paradise Street, Liverpool.

Coweys, Ltd. (98,833).—This company was registered on July 15th, with a capital of £6,000 in £1 shares, to adopt an agreement with L. E. Cowey, and to carry on the business of electric, hydraulic, mechanical, manufacturing, civil and mining engineers, founders, &c. The subscribers (each with one share) are:—K. Houston, 22, Lancaster Gate, W., solicitor; C. W. Inman, 104, Sternhold Avenue, Streatham Hill, S.W., clerk; E. P. Barrington, 139, Park Road, Kingston-on-Thames, clerk; B. B. Houston, 22, Lancaster Gate, W., articled clerk; W. P. Hunter, 117, Manor Street, Clapham, S.W., clerk; C. Brown, 18, Treherne Road, Brixton, S.W., clerk; E. W. Church, 70, Nightingale Road, Clapton, N.E., law clerk. Private company. The number of directors is not to be less than three or more than five; the subscribers are to appoint the first. Registered office, 39, Victoria Street, Westminster.

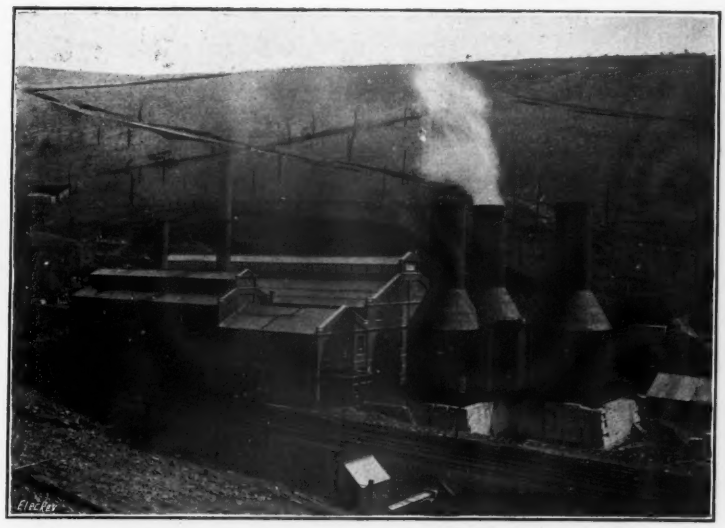
Electrical Regulators and Economisers, Ltd. (98,802).—This company was registered on July 13th, with a capital of £2,000 in £1 shares, to acquire and turn to account certain patent rights granted or to be granted to H. S. Martin, of Liverpool, relating to improvements in electric resistance, to make experiments in and exhibitions of applied electricity, magnetism, or similar agencies, &c. The subscribers (each with one share) are:—C. T. Wood, Oak Gables, West Kirby, retired provision merchant; E. H. W. Butterworth, 51, North John Street, Liverpool, director; R. M. Grierson, 22, Lord Street, Liverpool, estate agent; H. S. Martin, 16, Cumberland Street, Liverpool, electrical engineer. Private company. Table "A" mainly applies. Registered office, 51, North John Street, Liverpool.

THE ELECTRICAL EQUIPMENT OF THE FERNDALE COLLIERIES, SOUTH WALES.

Situated some 20 miles north of Cardiff, in one of the smaller Rhondda valleys, are the extensive Ferndale Collieries of Messrs. D. Davis & Sons, Ltd.

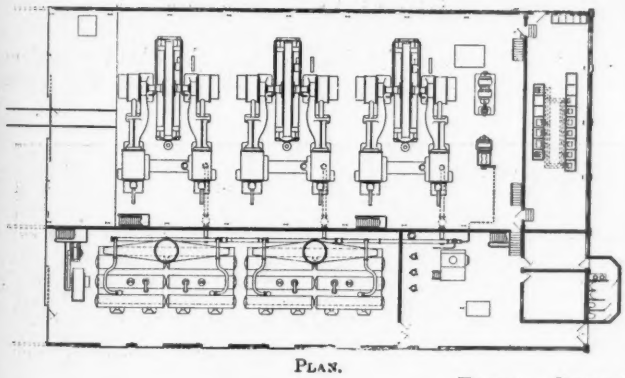
The Ferndale properties include a series of pits dotted over some three miles along the bottom of the valley; their yearly output of steam coal amounts to nearly $1\frac{3}{4}$ million tons, and some 6,500 men are employed by the firm.

With a view to securing greater efficiency in connection with its many power-producing and consuming appliances, the company recently decided to largely substitute electrical for steam driving, and, with this in view, called in Mr. W. H. Patchell, M.Inst.C.E., &c., consulting engineer, of Caxton House, Westminster, to prepare a suitable scheme. The latter embraces a generating station, which has been erected in Tylorstown, at the lower end of the series of pits, and from which a main overhead transmission, at 6,600 volts pressure, extends up the valley, calling at transformer sub-stations adjacent to the various pits.

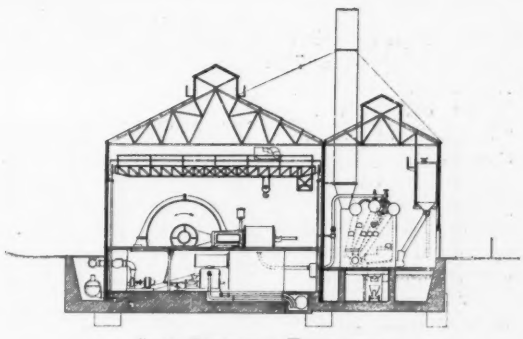


View of the Power Station for Supplying the Ferndale Collieries

The Tylorstown power station is a steel-framed brick structure, handsomely finished in glazed brick as regards the engine-room, and equipped with every modern appliance.

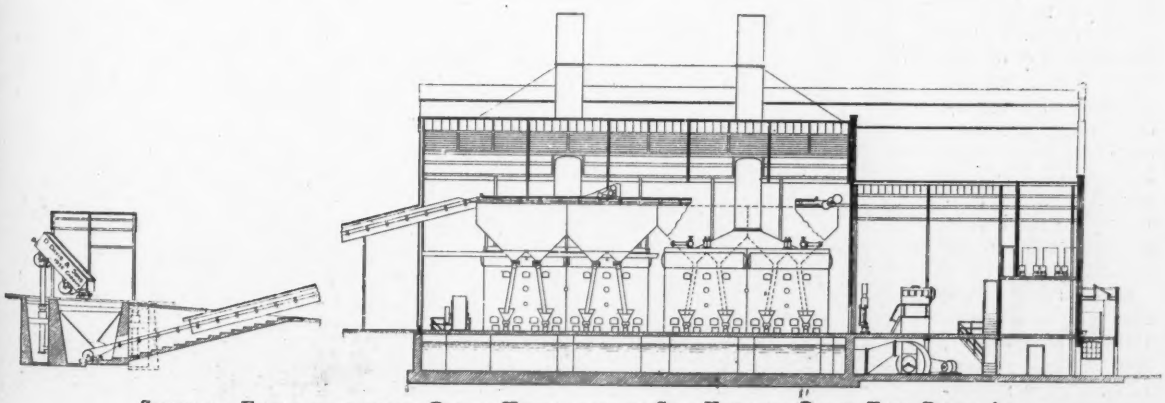


Plan.



Cross-Sectional Elevation.

Ferndale Power Station.



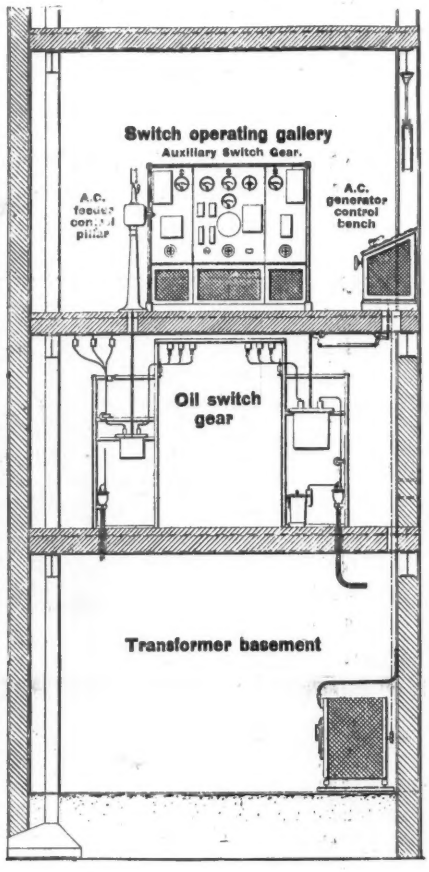
Sectional Elevation through Boiler House, showing Coal-Handling Plant, Feed Pumps, &c.

Four water-tube boilers of the three-drum Stirling type are installed in the boiler house. Each of these boilers has 6,209 sq. ft. of heating surface, and is provided with a

McPhail-type superheater of 800 sq. ft. heating surface; each is capable of evaporating 30,000 lb. water per hour at 180 lb. pressure and superheated 150° F.

Two underfeed stokers are fitted to each boiler, the furnaces of which are operated by forced draught supplied through ducts by two motor-driven Musgrave fans in the basement. Each pair of boilers is coupled-up through a breeches piece to a 7-ft. diameter steel chimney, some 75 ft. high.

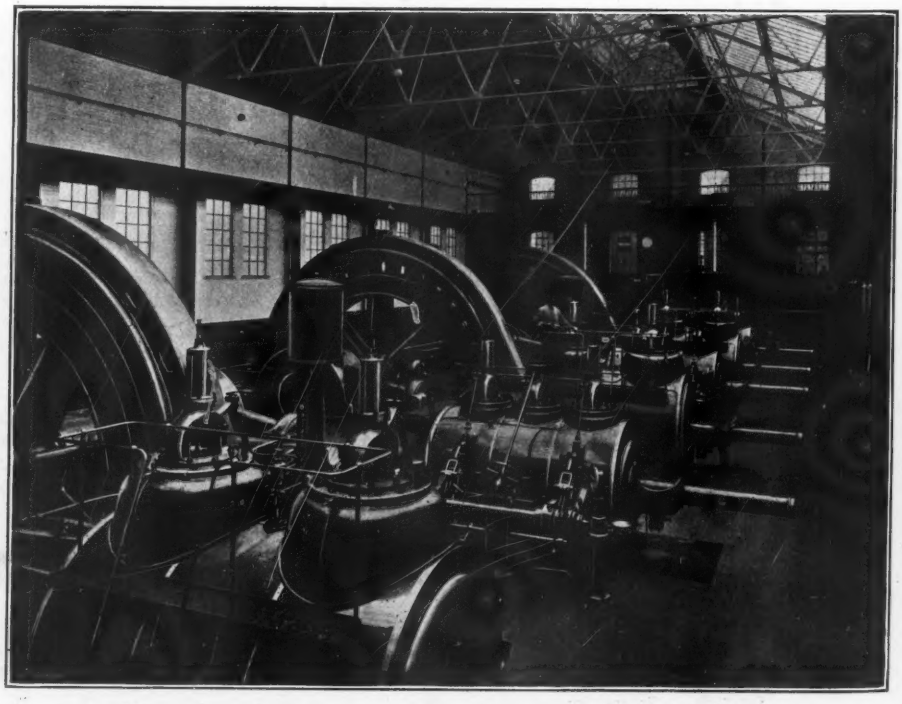
View in the Boiler House.



Section through Switch Galleries.

The coal used is "Ferndale small"; this is brought in wagons to an adjacent siding, where the wagons are tilted by hydraulic rams operated from the boiler feed pumps, their contents falling into a hopper. A 16-in. motor-driven-band conveyor, with a capacity of 20 tons per hour, transfers the coal to the top of the boiler house, where, by means of a throw-off carriage, it is discharged into steel bunkers of 150 tons capacity, and ultimately gravitates through shoots to the stoker hoppers.

The ashes from the grates are dumped, through sluice-valves, into small trucks running on a narrow-gauge tramway in the basement.



Interior of the Engine Room, showing 2,500-h.p. Sulzer-Lahmeyer Sets.

The water supply to the station is pumped from the company's No. 8 pit, which is close at hand, into two outside storage tanks; these latter are supplemented by a tank 100 ft. long under the boilers. One end of the boiler house forms a pump room, equipped with three Clarke, Chapman tandem compound feed pumps, each capable of delivering 5,000 gallons of water per hour. Duplicate steam supply is provided, *i.e.*, either direct from an auxiliary range or from the

main steam header; similarly, duplicate suctions and deliveries (either hot or cold) are provided.

heaters in the engine-house basement, heat the feed water prior to its passage through the pumps. As a stand-by a

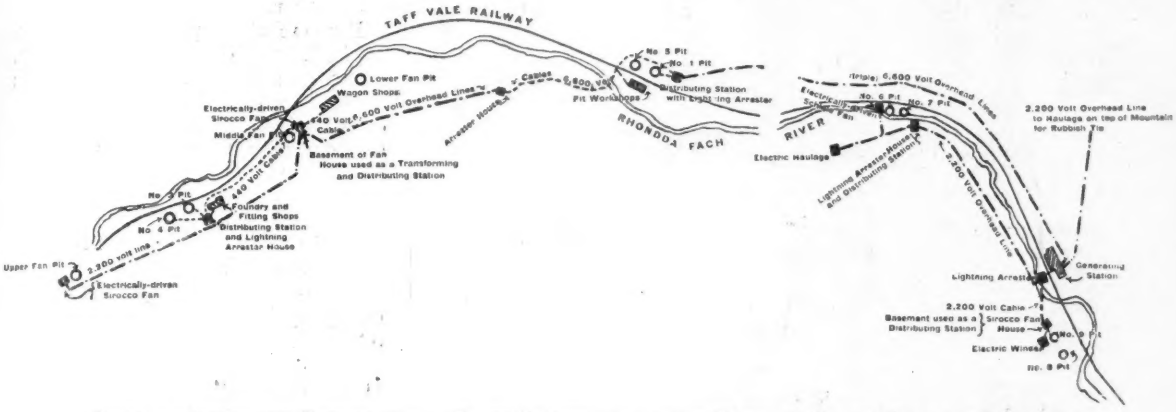
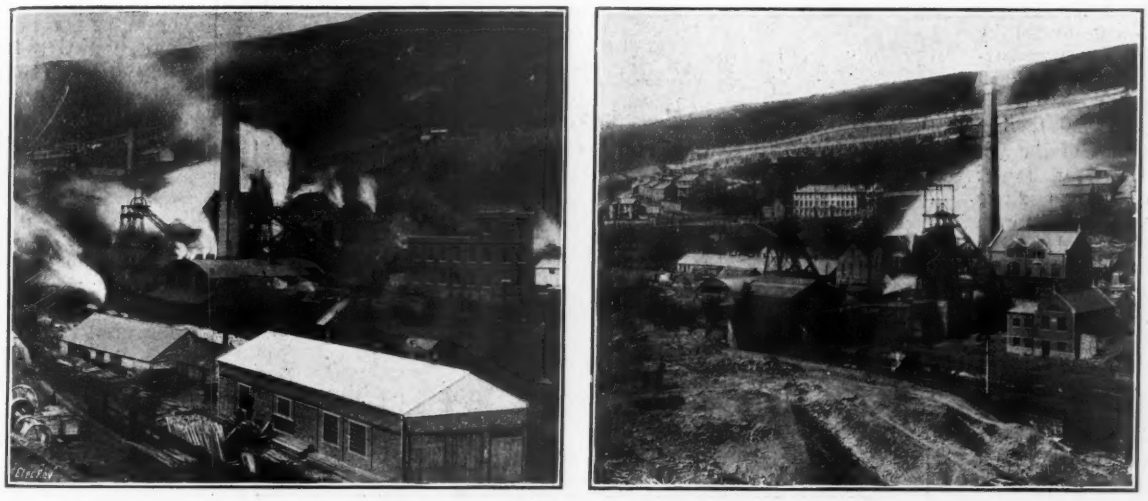
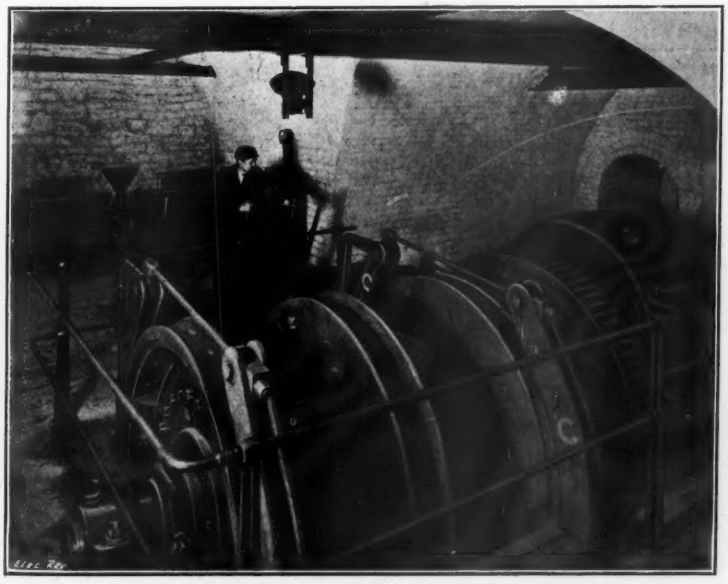


DIAGRAM SHOWING THE POSITION OF THE POWER STATION AND VARIOUS POINTS OF SUPPLY, FERNDALE COLLIERIES INSTALLATION.



VIEWS OF TYPICAL PITS SHOWING THE ELECTRICAL-WINDING ENGINE HOUSE (B.H. VIEW), AND DISTRIBUTING HOUSE (L.H. VIEW).



ONE OF THE UNDERGROUND HAULAGE PLANTS, FERNDALE COLLIERIES.

The feed-pump exhaust, also that from a Belliss exciter engine and the steam traps, is taken to a Cochrane open-type steam heater, and the latter and certain auxiliary

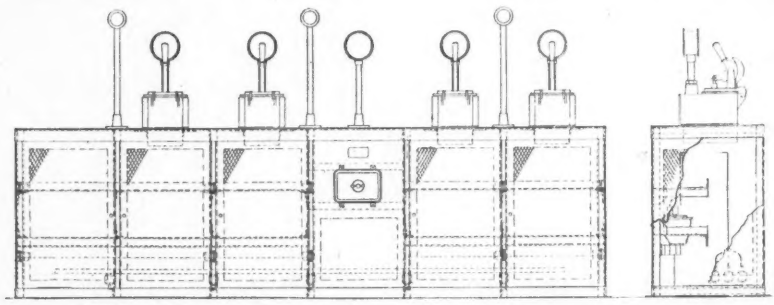
Worthington tank-pump, with a suction into the adjacent river, is provided to replace the main water supply in case of failure of the latter. A simple main steam header is provided behind the boilers, with engine branches leading into the basement of the engine house. The steam piping was supplied by Stewarts & Lloyd, and Templer & Ranoe screw-up spindle valves are employed.

The engine-house equipment at present includes three Sulzer cross-compound horizontal engines, each rated at 2,500 B.H.P., and coupled to Lahmeyer three-phase fly-wheel type generators, the speed being 94 R.P.M. These engines are substantially the same as described in the ELECTRICAL REVIEW of December 15th, 1905, being each provided with two jet condensers (in the basement) standing on their own air pumps, which latter are driven from coupling rods attached to the H. and L.P. crank pins respectively.

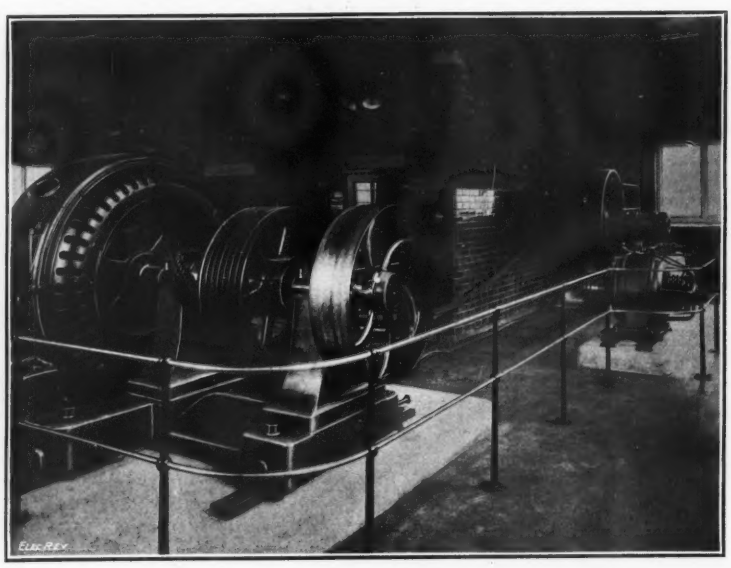
Tail rods carried on swivel bearings are provided to all cylinders, also a gravity oil lubricating system with return pumps and filters, and electrical barring gear on each engine. The auxiliary feed-heaters are inserted in the exhaust trunks above the condensers.

The injection water is taken from the cooling tower tanks through a 4-ft. main buried in the basement floor, and, after passing through the condenser, is collected in a hot-well header outside the building. From the hot-well the water is forced up to the cooling towers by 60-H.P. motor-driven centrifugal pumps situated in the basement. The motors, of the A.C. slip-ring type, operate on 2,200 volts, and are each provided with main and short-circuiting switches near by.

The cooling towers, which can be seen in our view of the station, are of the natural draught type, 33 ft. diameter and 83 ft. high; they are constructed with steel shells and interior wooden troughing, and stand on concrete tanks.



STANDARD TYPE OF IRONCLAD SWITCHGEAR, FOR DISTRIBUTING PURPOSES.



VIEW IN NEW FAN HOUSE, SHOWING ONE OF THE MOTOR DRIVES.

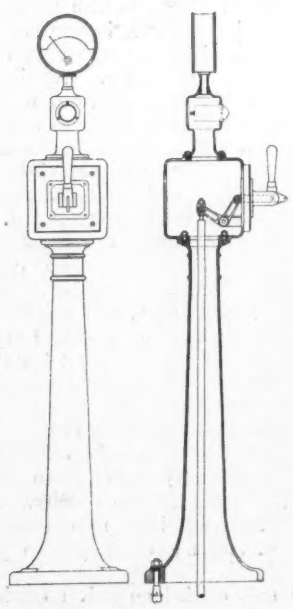
The main generators each have a normal continuous output of 1,600 KW. with a ·85 power factor and 2,200 volts pressure; the overload capacity is 20 per cent. for two hours, or 30 per cent. for half an hour.

For excitation purposes a 75-KW. Belliss-Lahmeyer set and a 100/120-KW. motor-generator-booster set are provided; the booster of the latter combination is capable of raising the pressure from 200 (the excitation pressure) to 290 volts for charging a 115-cell Tudor battery. This has a capacity of 380 ampere-hours at a 38-ampere rate, and is regulated by hand through a 21-contact regulating switch.

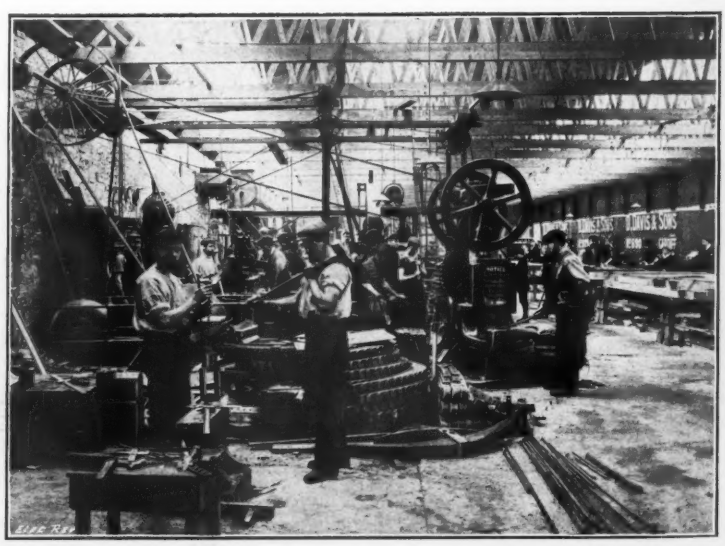
The battery can also be charged in emergency by the steam-driven exciter set.

The whole of the switchgear, which is of Messrs. Lahmeyer's make, is arranged on three galleries at the south end of the engine room. The middle gallery contains the operating switchgear, consisting of a three-panel bench board for the generators on the edge of the gallery, and a series of seven feeder pillars some distance behind.

The switch handles are of the loose type, and are mechanically coupled to oil switches on the gallery below; the generator panels carry the usual instruments for dealing with the generator output, and for synchronising and excitation, Ferranti reverse current relays being also provided in the generator circuits. An illuminated synchroniser is suspended over the bench.



FEEDER CONTROL PILLAR: POWER STATION SWITCHGEAR.



THE WAGON SHOP, WHICH HAS BEEN CONVERTED TO ELECTRICAL DRIVING.

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The feeder pillars control three transmission lines, the station supply, the supplies to Nos. 6 and 7, and Nos. 8 and 9 pits—the last two having two separate feeders.

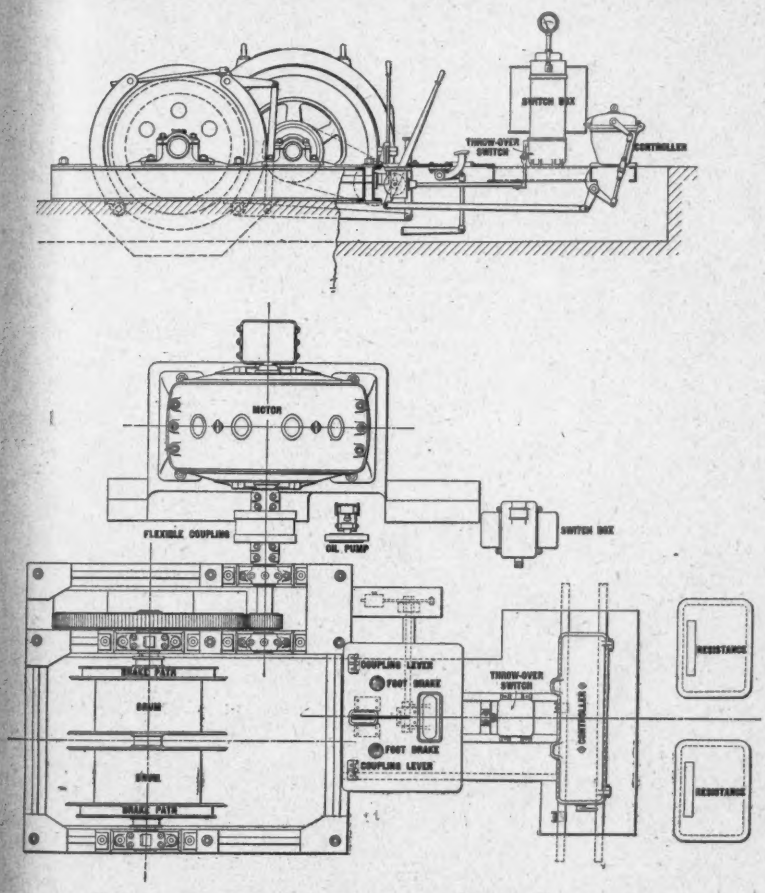
The pillars are of simple design (as shown on page 182), carrying an ammeter, indicating lamp and switch handle.

Indicating lamps are also fitted on the generator panels, their function being to light up when the main switches trip out—the switch handles being unaffected.

The station supply pillar is fitted with an additional earthing device for testing the lines.

The three bus-bars are arranged in the form of a rectangle under the switch gallery, with the generator and feeder oil switches enclosed in grilled iron compartments, on opposite sides; the feeders and generators are coupled up through meters fitted in the end sections of the bus-bars. Isolating links are provided to both feeder and generator switches, and maximum relays in the feeder circuits.

From the feeder switchgear, the circuits leading to the distant transmissions lead through one 1,000-KW. and two



Views showing the Arrangement of a 200-H.P. Haulage Gear.

500-KW. step-up (2,200/6,600-volt) transformers in the basement, and then to an extra-high-tension switch chamber on the top gallery, from which the outgoing feeders pass, through porcelain pipes in the wall, to the transmission lines.

The upper switch-chamber contains switchgear for coupling the lines and feeders as required; isolating links, fuses and lightning arresters are also fitted in each line.

An auxiliary fuse-panel controls the supply to the A.C. motors in the station, and a direct-current board on the operating gallery controls the steam-driven exciter, motor-generator and battery.

Both the hot and cold feeds to the boilers are fitted with Venturi meters, and Sarco CO_2 recorders and draught-gauges are provided in connection with the boiler plant.

The location of the station and various points of supply will be gathered from the plan (page 181); it will be seen that energy is taken by main feeders (both underground and overhead) to distributing centres at the various pits. The motors are generally worked at 2,200 volts, but in certain places, in accordance with the Home Office rules, the pressure has to be stepped down by transformers to 440 volts.

Nos. 6 and 7 pits are only about 900 yards from the power station; energy is therefore taken direct (overhead) to them at 2,200 volts. In the case of Nos. 1 and 5 pits at Ferndale, which are 2,500 yards away, and Nos. 2 and 4 pits, which are some 2,000 yards beyond them, up the valley, energy at 6,600 volts pressure is transmitted overhead on duplicate lines. Beyond the switch house at Nos. 1 and 5 pits, the 6,600-volt line is cabled where it passes through Ferndale Village, and then carried overhead to a fan house where suitable transforming plant reduces the pressure to 2,200 volts for supplying Nos. 2 and 4 pits. Duplicate pole lines are provided for the main transmission up the valley, two circuits being carried on one line and one circuit on the other; creosoted wood poles are employed, protected by an earth wire carried on the pole tops, every fourth or fifth pole being earthed.

A typical distributing station at Nos. 1 and 5 pits is arranged with the transformers on the ground floor, the switchgear on the floor above and the incoming lines entering a small chamber above that, in which also the lightning arresters are placed.

The H.T. transformers are of Messrs. Lahmeyer's oil-cooled type for stepping down to 2,200 volts; the H.T. switchgear is of the same makers' ironclad type, in the form of two benches, containing the 6,600 and 2,200-volt bus-bars and oil switches respectively. The 2,200-volt switchgear controls two cables which pass down the adjacent Nos. 1 and 5 pits, also two Berry air-cooled transformers which step down the pressure to 440 volts for the surface lighting and motors. For controlling the L.T. output from these latter transformers a further switch bench of similar design to the others is installed.

The bare 6,600-volt lines enter the switch house through porcelain pipes; below the arrester choke coils, and throughout the switch and transformer chambers, rubber-insulated asbestos-braided cable is employed, carried on insulators and coupled up to the outgoing feeders in special terminal boxes. The cables carried down the pits are of the double wire-armoured paper-insulated three-core type, clamped at intervals of 15 yd. to cross timbers. The clamps consist of rectangular wood blocks, bolted together with the power and telephone cables in between.

At the pit bottom, in each case, the feeder passes to a lock-up switch house, equipped with a similar ironclad switch bench to that employed in the distributing house above, containing bus-bars and oil switches for controlling armoured three-core feeders for supplying the haulages and pumps.

Where possible the underground cables are carried on wooden supports, and cleated to the side of the tunnels.

Galvanised earth cables, $\frac{3}{8}$ in. diameter, run from the machines to iron earth plates, about 1 yd. square, immersed in the sump at the bottom of the shaft.

Some 22 haulages are being installed, varying in size from 200 H.P. to 50 H.P. The gears were made specially heavy to Mr. W. H. Patchell's specification, by the Uskside Engineering Co. Lahmeyer slow-speed motors have been generally adopted, and the electrical equipment is of massive construction; the controllers being of a new design arranged by the consulting engineer.

The haulages are generally of main and tail type, and work at a speed of six miles an hour. They are principally of single reduction, but in some cases to suit the exigencies of the positions in which they had to be installed, double reduction type has been chosen. In all cases there is a flexible coupling between the motor and the gearing, which to a very large extent takes the jar of the gear off the

motor. These electrically-driven gears are very popular with the drivers; and, owing to their reliability and ease of working, not only have great economies been effected over the old steam-driven haulage gears, but it has also been possible to obtain a greatly increased output, as there are no delays in starting up—the haulage gear commencing work immediately the driver manipulates the lever.

We illustrate on page 183 one of these haulages, showing the arrangement of the resistances, controller and reversing switch; the small oil-pump driven from the coupling box circulates oil through the resistances, &c.

The underground pumping is now being handled electrically by three-throw pumps and high-lift Sulzer centrifugal pumps.

The lighting of the pit bottom, switch houses, haulages, &c., is carried out electrically, and cables will eventually be run in conduit cleated to the walls for this purpose.

The ventilation of the pits is a most important part of the work, not only from the colliery manager's point of view, but also inasmuch as the continuous user makes it a most desirable load for the power station.

At pit No. 9, which is a new pit adjacent to the power station, a "Sirocco" fan has been put down to handle 300,000 cb. ft. of air per minute at a 4-in. water-gauge. This fan is rope-driven from either end of its shaft by two 300-H.P. motors working at 375 R.P.M. One of the "Schiele" fans, which has been driven for several years by a steam engine, and delivering 300,000 cb. ft. of air per minute at 3·5-in. water-gauge, has lately been converted to an electrical drive.

Two further "Sirocco" fans are at present being installed, each capable of giving 125,000 cb. ft. of air per minute at 4-in. water-gauge.

We show on page 182 one of the fan-drives at No. 9 pit; the switchgear controlling each motor, consisting of a main oil-switch and rotor circuit switches, is mounted just behind it. These motors are fed through the basement of the fan house, which in this and similar cases is utilised as the distributing station for the adjacent pits, containing ironclad 2,200-volt switchgear of similar design to that previously described. This distributing station is fed direct by underground cable, at 2,200 volts, from the power station bus-bars.

The surface lighting in the majority of cases will be on direct-current circuits, duplicate motor-generators being installed for transforming the alternating current.

The No. 9, or new pit, is being entirely equipped with electrically-driven plant, including an electrical winding engine of the Ilgner pattern, which is nearly completed and will raise 1,800 tons of coal per day.

The new engine house is a substantial building, lined with glazed brick and measuring some 78 ft. × 41 ft. The winding drum, some 16 ft. dia. and 9 ft. wide, is coupled to two motors which will exert some 2,500 H.P. for winding purposes; we hope at a future date to describe this plant in detail.

A complete telephone installation couples up the power station with each switch house, both above and below ground, the instruments being of the mining pattern. Instruments of normal pattern are also provided for communicating with the offices and departments on the surface.

The various fitting shops and workshops connected with the pits, the screening plant and various surface pumps are all being converted to electrical driving.

In conclusion, we are indebted to Mr. W. H. Patchell, who has acted as consulting engineer throughout, for assisting us in the preparation of this article. Mr. Patchell has collaborated with Mr. David Hannah, manager to the Ferndale Collieries, and our thanks are due to the latter gentleman for facilitating our inspection of this interesting installation.

Canada.—The Montreal City Council, after a nine hours' sitting, has decided to accept the offer of the Robert Syndicate for supplying electricity in the city. The by-law adopted requires the company to supply 5,000 H.P. by 1910 and 20,000 H.P. by 1915, at definite rates agreed on. For incandescent lighting the rate of charge will not exceed 10 cents per KW., and is subject to discounts of from 5 to 10 per cent. For power the charges vary from $40 to $8 per H.P. per annum, according to amount and usage.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Coatbridge and Airdrie Electric Supply Co., Ltd. (89,178).—A charge dated June 29th, 1908, to secure £7,235 17s. 8d., charged on the company's undertaking and property, present and future, including the Coatbridge and Airdrie undertakings and uncalled capital, has been registered. Holders: County of London Electric Supply Co., Ltd., Moorgate Street, E.C.

Cowans, Ltd. (electricians, Manchester) (57,378).—A memorandum of satisfaction to the extent of £2,000 of debenture stock, dated February 26th, 1908, securing £5,000, has been filed.

Rhondda Tramways Electric Supply Co., Ltd. (94,770).—Particulars of £44,000 debentures created by resolution of August 7th, and secured by a trust deed dated August 8th, 1907 (already registered), have been filed pursuant to Sec. 14 (4) of the Companies' Act, 1900, a debenture of recent date having been produced to the Registrar. Property charged: The benefit of the said trust deed, the benefit of an assignment of leasehold redemption policies dated March 16th, 1908, and the company's undertaking and property, present and future, including uncalled capital. Trustees: C. A. Scott-Murray (director of Sun Life Assurance Society), 63, Threadneedle Street, E.C., and L. B. Schlesinger, 21, Cornhill, E.C.

Buenos Ayres Electric Tramways Co. (1901), Ltd. (71,206).—An acknowledgment of indebtedness under seal, dated June 29th, 1908, to secure a further £7,000 second or "B" debenture stock (ranking *pari passu* with and supplemental to £71,600 forming part of a total authorised sum of £100,000 similar stock secured by a trust deed dated March 30th, 1906, and two acknowledgments of indebtedness dated March 7th, 1907, and May 27th, 1908), has been registered. Property charged: Certain tramway concessions, freehold land, rights and the company's undertaking and property, present and future, including uncalled capital. Trustees: W. Greenwell, 2, Finch Lane, E.C., and F. C. Tiarks, 145, Leadenhall Street, E.C.

South London Electric Supply Corporation, Ltd. (50,392).—This company's annual return was filed on May 29th, when the entire capital of £260,000 in £4 shares had been taken up and paid for in full. Mortgages and charges: Nil.

Hartlepool Electric Tramways Co., Ltd. (49,734).—This company's annual return was filed on June 4th, when the entire capital of £100,000 in £10 shares had been taken up and paid for in full. Mortgages and charges: £50,000.

Waterworks Lighting and Power Investment Corporation, Ltd. (88,390).—Issue on June 29th of £410, and on June 30th of £1,000 6 per cent. debentures, part of series created August 8th, 1906, to secure £10,000, charged on the company's property, present and future, including uncalled capital. No trustees. Total amount previously issued of same series: £8,255.

Tramways and Light Railways Estates Co., Ltd. (65,201).—A statement of the total amount outstanding on July 1st in respect of mortgages and charges created prior to that date and not required to be registered under Sec. 14 of the Companies' Act, 1900, has been filed pursuant to Sec. 12 of the Companies' Act, 1907. Date of charge: December 23rd, 1902. Amount secured, £700. Property charged: Moxham's Yard, Oystermouth Road, Swansea.

Fleetwood and District Electric Light and Power Syndicate, Ltd. (49,666).—A notice of the appointment of W. Cash, chartered accountant, of 90, Cannon Street, E.C., as Receiver, by Order of Court dated March 13th, 1903, has been filed pursuant to Sec. 11 (2) of the Companies' Act, 1907.

Maxim Electrical Co., Ltd. (Walthamstow) (84,426).—A notice of the appointment of J. Poynter, of Maxim Works, Shernhall Street, Walthamstow, and G. Stirling, of same address, as receivers, on March 12th, 1908, by C. Bright, under powers contained in debentures, has been filed pursuant to Sec. 11 (2) of the Companies' Act, 1907.

Britannia Electric Lamp Works (1905) Ltd. (86,967).—A notice of the appointment of J. J. B. Cross, of 65, Linzee Road, Hornsey, as receiver and manager, by order of court dated May 1st, 1908, has been filed pursuant to Sec. 11 (2) of the Companies' Act, 1907.

D.P. Battery Co., Ltd. (44,084).—This company's annual return was filed on July 4th, when the entire capital of £10,000 in 4,996 "A," 4,996 "B" and 8 other shares of £1 each had been taken up and paid for in full. Mortgages and charges: £12,000.

CITY NOTES.

Direct United States Cable Co., Ltd.

THE sixty-second ordinary general meeting of the shareholders of this company was held on Tuesday at Winchester House, Old Broad Street, Mr. E. M. Underdown, K.C., presiding.

The CHAIRMAN, in moving the adoption of the report (ELECTRICAL REVIEW, page 149), said that the revenue for the six months to June 30th, after deducting outpayments, amounted in round figures to £51,367, while the working and other expenses, exclusive of the cost of maintenance of cables, absorbed £24,932, leaving a balance of £26,435 as net profit. That, with £6,397 brought forward, and £2,229 in adjustment of income-tax, made a total of £35,131, which had been appropriated as follows:—Interim dividend 4s. per share to March 31st, £12,142; proposed final dividend of 4s. per share and a bonus of 1s. per share to June 30th, £15,177; transferring to reserve fund account £5,000, leaving a balance of £2,812 to be carried forward. The revenue showed a falling-off of £5,688, as compared with the corresponding period of 1907, when the great activity that had characterised the Atlantic business began to show signs of falling off. That was followed by serious financial difficulties in America, the effects of which had not yet entirely disappeared. On the whole, he thought they might congratulate themselves that they had not suffered more than they had in consequence of the financial disturbances in that country. The reserve fund had been credited with £9,295 from interest on investments; £2,189 from profit on sale of securities; and £5,000 transferred from revenue. On the other side it had been debited with £12,853 for the cost of maintenance of cables, and the balance of the account now amounted to £505,196. If they took the result of the interest and profits upon the reserve fund for the

whole year, it would be found that the expense of the maintenance of cables had been completely covered. One of the most important features of the company was the reserve fund. The ideal figure at which they aimed was £500,000, and it was little short of that at the present moment, which was a matter of congratulation. Twelve months ago things looked very gloomy, and they then thought it prudent to set aside £40,000 in order to cover any deficiencies which might arise in the valuation of their securities. He was very glad to say now that the price at which their securities stood would be realised if they had to sell. Dealing with the whole financial year, their receipts had amounted to £111,935, while the expenses had amounted to £50,035, leaving a balance of £61,900. They had paid away in dividends £51,603; they had placed to reserve £10,000, and they had an increased balance in hand of £279. The reserve fund had been increased on balance during the year by £13,228. £10,000 had been transferred from revenue; interest on investments, £18,490; and profit on sale of securities, £2,688. From those amounts, £17,950 had to be deducted for the cost of maintenance of cables. There had been some apprehension as to the damage to cables by trawling vessels on the coast of Ireland, and on the other side of the Atlantic. It had been found that damage had been caused in some cases. He did not think it applied to their cables, but still it was a matter of very great importance, and the Postmaster-General appointed an Inter-Departmental Committee to examine into the question. That Committee was now considering the matter, and he had no doubt that measures would be taken as far as practicable to secure submarine cables from damage in that way. Representatives from their company had attended the inquiry, and submitted various recommendations. The other matter to which he wished to call attention was the International Telegraph Conference, which had been held at Lisbon. They were represented at the Conference, and he was glad to say that nothing of a prejudicial character to their undertakings came forward, and the Conference would not be renewed for another seven years.

Sir James Pender, Bart., seconded the motion, and the report was adopted.

Metropolitan Railway Co.

The report of the directors for the half-year ending June 30th, 1908, submitted at yesterday's meeting, shows that the total receipts on revenue account have been £356,786 16s., and the expenses £199,780 6s., leaving a profit of £157,006 10s. Compared with the corresponding half-year of 1907 the receipts show an increase of £11,267 6s., and the expenses an increase of £6,419. The net revenue account, after providing for the interest upon the debenture stocks and other fixed charges, and the dividend upon the preference stocks, shows a balance of £18,002 16s., from which the directors recommend a dividend upon the ordinary stock, at the rate of 10s. per cent. per annum, and to carry forward the balance of £3,672 13s. to the next half-year's accounts. The Surplus Lands Committee announces that the dividend on the Surplus Lands stock, for the past half-year, will be at the rate of £2 15s. per cent. per annum. During the half-year the train services have been considerably increased, and a greater mileage has consequently been run. The full benefit has not yet been felt in the receipts, but it is expected that as the greater facilities offered by the company become better known among the travelling public the traffic will respond. It is now more than twelve months since the last of the tube lines was opened, and the immediate effect of that competition is therefore known. The opening of the several tubes has caused a serious diversion of traffic from the Metropolitan line, but it has at the same time given rise to a large increase in the amount of local travel generally, which will be a continuing benefit to this company. On some sections of the line the traffic during the half-year has shown a healthy expansion, and on others, where there has been a falling-off through competition, steps are being taken to prevent further loss and to regain the business. Owing to the delay in the completion and opening of the Franco-British Exhibition, the traffic from that source was not so great during the past half-year as was contemplated. It has, however, increased since the beginning of July, and it is fully expected that it will develop largely as the holiday and excursion season advances. Throughout the half-year the electrical plant and machinery have given every satisfaction in working, and the current continues to be produced at a figure which compares very favourably with other installations. During the half-year some 48,243,951 passengers were carried; the train mileage being:—Electric, 1,705,011; steam, 148,963; goods and mineral, 97,712. The company worked some 82 miles of route, including 4 miles of foreign route.

Edmundsons' Electricity Corporation, Ltd.

The report of the directors for the year ended March 31st, 1908, to be presented at the annual meeting on August 6th, states that the net profit after payment of debenture interest amounts to £2,610 9s. 9d., which, with the sum of £17,806 16s. brought forward from last year, makes a total of £20,417 5s. 9d. The directors recommend that this amount should be carried forward to the next account. The loss on working the local authority undertakings has this year, in addition to the net amount of the urban company guarantee, been deducted from the gross trading profit and shown on the profit and loss account.

The diminished return shown on loans and investments is entirely attributable to the fact that a much larger provision for reserve and depreciation has been made by the subsidiary companies, an additional amount of over £12,000 having been so set aside, of which over £10,000 is apportionable to the corporation's holdings in these companies.

The directors believe that this more liberal application of profits to these purposes is calculated to enhance the credit and strengthen the position of the corporation no less than that of the subsidiary companies, whilst the money is equally available for capital purposes, whether it is so dealt with or whether it appears in the corporation's accounts.

Although not apparent on the face of the accounts, which can only reflect improvement in the accounts of the subsidiary companies to the extent to which those companies make larger dividend distributions, the directors are satisfied that the position is better than it was a year ago, and that there is evidence of its steady improvement. The gross profits of the subsidiary companies have increased during the year by £9,433, the amount expended on capital account during the year being £69,065. This compares with £92,760 for the previous year. The reduction of £40,926 in the item of investments and advances to subsidiary companies is accounted for by a reduction in the amount of the advance to the urban company consequent upon the issue of £75,000 debenture stock by that company. A sum of £1,491 3s. 10d. has been added to the reserves, which now amount to £183,564 6s. 9d., making with the reserve fund of £95,000 and the profit balance of £20,530 12s. 5d. a total reserve of £299,094 19s. 2d. As the shareholders are aware, the report of the committee appointed at the last annual general meeting was adopted by the shareholders at the extraordinary general meeting of the company held for the purpose in February of this year. The committee's report included recommendations for the appointment of the present board and for the creation of £200,000 prior lien debenture stock. The consent of the debenture stockholders to the immediate creation of £100,000 5 per cent. prior lien debenture stock was subsequently obtained, and that amount of stock has accordingly been created and recently issued. The proceeds of this issue are expected to provide for the corporation's capital requirements during the next two years, and the directors believe that this provision will go far towards safeguarding the financial position of the corporation.

Mr. F. E. Gripper has resigned his position of managing director, and is now the general manager of the company. Mr. Stanley Beeton was appointed to a seat on the board in accordance with the recommendations of the Committee above referred to, and the shareholders will be asked at the meeting to confirm this appointment. Mr. P. D. Tuckett retires by rotation, and offers himself for re-election.

Schedule Showing Capital Expenditure and Gross Profits of Subsidiary Companies for the Years 1906 and 1907.

Name.	Capital expended.		Gross profit.	
	Dec. 31, 1907.	Dec. 31, 1906.	1907.	1906.
Alderley	£46,065	£45,727	£1,452	£1,309
Bromley	155,150	148,637	12,163	10,825
Folkestone ..	193,591	187,249	12,782	11,262
Isle of Wight ..	258,430	256,284	10,731	9,501
Ilfracombe ..	32,484	30,763	234	283
Lymington ..	36,211	35,510	1,396	1,373
Melton Mowbray	39,993	39,815	1,777	1,622
Newmarket ..	39,336	38,462	2,583	2,045
North of Scotland	104,688	104,214	1,543	1,737
Ramsgate	87,164	35,100	1,342	698
Scarboro' Trams.	99,580	99,499	—22	1,118
Salisbury	69,607	70,402	5,148	4,828
Urban Co... ..	1,049,957	1,011,746	35,274	31,429
Winchester ..	88,239	86,622	6,842	6,291
Wycombe	99,661	99,174	4,366	4,219
Guernsey	127,836	128,359	4,423	4,412
Cromer	31,280	30,956	704	807
Dorking	36,995	35,849	1,463	1,511
Frome	51,408	49,856	681	767
Hamilton	61,571	57,038	1,653	1,385
Surbiton	54,651	54,270	3,308	2,938
Total	£2,713,897	£2,644,832	£109,793	£100,360

The equivalent 8-c.p. lamp connections increased during the year from 1,023,660 to 1,145,505.

Particulars of Investments in and Advances to Subsidiary Companies.

Company.	Shares.	Debentures.	Advances.
Alderley and Wilmslow Elec. Supply Co. ..	£3,856	£5,000	£37,585
Bromley (Kent) Elec. Light and Power Co. ..	28,100	—	—
Folkestone Electricity Supply Co.	18,475	—	—
Guernsey Electric Light and Power Co. ..	84,544	49,500	—
Isle of Wight Electric Light and Power Co. ..	118,900	39,898	12,293
Ilfracombe Electric Light and Power Co. ..	335	—	36,612
Lancashire Power Construction Co.	85,900	—	—
Lymington Electric Light and Power Co. ..	18,309	9,600	1,791
Melton Mowbray Electric Light Co.	15,910	19,900	—
Newmarket Electric Light Co.	5,650	8,000	—
North of Scotland Elec. Light and Power Co.	49,470	—	47,707
Ramsgate and District Elec. Supply Co. ..	220	—	39,062
Scarborough Tramways Co.	64,100	—	26,848
Salisbury Electric Light and Supply Co. ..	24,919	20,000	—
Urban Electric Supply Co...	236,820	—	169,560
Winchester Elec. Light and Power Co. ..	16,815	9,000	—
Wycombe (Borough) Elec. Light and Power Co.	31,160	33,700	21,718
	£793,474	£194,598	£391,671

Summary.

Shares	£793,474
Debentures	194,598
Advances	391,671
Investment in Cromer, Dorking, Frome, Hamilton and Surbiton (local authorities) undertakings	30,031
	£1,409,774

General Electric Co., Ltd.

THE ordinary general meeting of the shareholders of this company was held on Friday last at the offices, 71, Queen Victoria Street, Mr. G. Byng presiding.

The CHAIRMAN, in moving the adoption of the report (see ELECTRICAL REVIEW, p. 149), said that a further allotment of ordinary shares had been made during the year, and they had now £360,000 in ordinary shares, thus considerably increasing the security of the preference shareholders. They had added £15,000 to their plant and machinery during the year, and had written off £17,000 for depreciation. Their stock-in-trade was almost exactly the same in value as last year, but in bulk it was considerably larger, as the rate at which it was taken was considerably lower. Their investments now stood at nearly £60,000—£4,000 more than last year. That £4,000 had been invested in subsidiary companies, which were yielding them good returns. The profit last year was less by nearly £9,000, and he could but acknowledge that the profit they had made had not been satisfactory, or an adequate return for the large capital invested. The main cause of the reduced profits was the fact of the price of raw materials falling suddenly. While in the previous year they suffered from the advance in prices, in that they could not obtain the extra price for their manufactures, this year the fall in prices had affected them, mainly on account of the large stock they were required to keep. When they considered that a stock of over £300,000, largely composed of copper, iron, india-rubber, &c., had to be written down in accordance with the market fluctuations, some of which were 30 or 40 per cent. below the prices quoted six months ago, they could imagine that it was a serious item for the company. During the year they had introduced the "Osram" metal filament lamp. The outlook for the business was a very good one, and soon they would be able to put on the market English made "Osram" lamps. After careful study they had decided to enter the field of telephone exchange equipments, and the Post Office authorities had already entrusted them with a very important contract for the equipment of one of the largest telephone centres in the kingdom. The particularly gratifying feature of that policy was that it emancipated the Government from the necessity under which they had been up to the present of buying this important and costly equipment in the foreign market. In their desire to keep up to date, improvements were being constantly introduced in almost every department, the most prominent amongst those of the past year being the production of their "Angold" magazine arc lamp, which he trusted would play an important part in all coming street lighting schemes. Their carbon and engineering works had done excellent work during the past year, but he regretted that the financial results in those two enterprises had been disappointing. The quality of their carbons was admitted, even by their competitors, to be equal to the best that could be produced. Their thanks were due for the support which the Admiralty was giving them in this respect. As regarded their engineering works, there was no special feature, so far as their works were concerned, to distinguish them from other electrical engineering factories in this country. At Witton they had carried out a great amount of work, and he might specially mention a large contract for the tramway department of the L.C.C. and the Mint at Calcutta. It was generally known that electrical engineering of the larger kind, such as the making of dynamos and motors, had become most unprofitable in this country. With very few exceptions almost all the 40 or 50 electrical engineering works were complaining to such an extent, that unless something was done he was quite convinced that a number of them would have to shut their doors. It was a crying scandal, and should be thoroughly investigated. Mr. Garcke proposed a combination of manufacturers, with a view to a remedy, but while he (the chairman) agreed that such a step might do considerable good, he was afraid no real improvement of a permanent nature could possibly be expected unless our fiscal policy was altered.

MR. H. HIRST seconded the motion, and the report was adopted.

City and South London Railway Co.

THE forty-eighth ordinary general meeting of the above company was held on Tuesday at the offices, 71, Finsbury Pavement, E.C., under the chairmanship of the Right Hon. C. B. Stuart Wortley, K.C., M.P.

The CHAIRMAN, in moving the adoption of the report (ELECTRICAL REVIEW, p. 149), said the extension to King's Cross and Euston had been in operation during the whole of the six months as compared with only seven weeks in the corresponding period of last year. They had an increased gross revenue from all sources of £6,044, and working expenses had gone up by £4,372. Working expenses still stood at only 46·28 per cent. of the gross receipts. The resulting increase in the net revenue account was £1,672. Unfortunately this was all that they had to set against the heavy increased charges entailed by the capital cost of the new works. The item of £4,131 for general interest received in the 1907 half-year was represented by no corresponding item in the 1908 half-year. In 1907 the contractors bore for nearly the whole six months, in the form of interest paid by them to the company for money found by the company for them, a great part of the charge for capital raised for the new works; whereas in 1908 the company had had to bear it all themselves for the whole time. If they added to this £4,131 the increase of £1,367 in the charge for debenture interest, the increase of £209 in the amount (£275 against £66) of their share in the rent of the new station and subways at Euston, and the net charge of £672 for bank and other interest outgoings which 1908 showed, against the net receipt of £4,131 in 1907, they got a total of £6,379 of charges against net revenue that they had to find this year. Add to this the fact that their January carry-over this year was £1,401 less in 1908 than in 1907, and they got a total of £7,780, against which their only set off was the increase of £1,672 above-mentioned, leaving £6,108 less available for dividends than last year. There was also £1,282 more to be found for preference dividends than last year. The £7,400 which would be made available if the shareholders sanctioned the board's paying 1 per cent. less on ordinary stock than last year, just covered the £6,108 and the £1,282, and enabled them to carry forward about the same amount as last June. The June half-year of 1908 was fractionally worse than the December half of 1907 in respect of receipts per train-mile (2s. 5·03d. against 2s. 7·84d.). But the June half-year of 1908 was fractionally better than that of 1907 in respect of:—Receipts per train 17s. 9·04d., against 17s. 1·73d.; expenses per train-mile 1s. 2·16d., against 1s. 2·94d.; loco. charges per train-mile 4·68d., against 4·70d.; and traffic expenses per train-mile 6·29d., against 6·80d. These improvements had been shown in spite of higher prices for coal and other stores in 1908 than in 1907. Coal cost them an average of 14s. 5½d. per ton in 1908, against 13s. 10⅞d. in 1907. As to receipts attributable to the new extension, they found that the bookings to and from Euston and King's Cross and from stations on the Hampstead Tube produced in the first 19 weeks of this half-year the gross sum of £13,386, as against nil in the corresponding weeks of the 1907 half-year, during which those two stations were not as yet open. Calculations had been furnished to him which suggested that the old line showed a decrease on the half-year of £8,353. This looked as if the new line had come in strongly to the aid of the old, while it had not unduly increased working expenses, and they had to look elsewhere for the causes of their not having received a better gross revenue. The report mentioned some of them: Better weather in 1908 than in 1907; a less attractive exhibition at the Agricultural Hall; increased tramway competition to the Angel, and possibly elsewhere. To these might be added the diminished exchange bookings between themselves and the Great Northern and City Railway. Through bookings with the Central London Railway came into operation on April 17th, and there was every reason to hope that they would have a beneficial effect on the traffic. The fire which occurred on July 16th at Moorgate Street Station was prevented in good time from ever becoming dangerous, caused no panic, and no injury to any passenger, and did very little harm to railway property. He was not able to suggest the cause, because that was now the subject of the official inquiry which was being held under the authority of the Board of Trade. Officers were already considering and effecting over the whole system, in the light of the indications that the case afforded, the removal of every discoverable thing that could possibly lead to such a thing happening again, and every possible addition to the existing provisions and regulations for securing at all times and in all places the safety of passengers. The Exhibition at Shepherd's Bush had tended to draw people away from the Agricultural Hall and from cricket matches at the Oval, but they got a certain number of "short hauls" in the case of passengers making for the Exhibition by Tube.

MR. C. S. GRENFELL seconded the motion.

MR. ANDREWES asked if the board had considered the advisability of laying steel sleepers in the Tube when the time came for relaying the line?

COL. PERRY suggested that particulars might be posted in the stations showing passengers what precautions were taken in the case of accidents. This would tend to allay panic.

MR. CLARKSON thought it would be wise, considering the tramway competition, to offer lower fares during the slack periods of the day.

Replying to these and other questions, the CHAIRMAN said the renewal account was having the serious attention of the board, and if they thought it necessary to place a small amount more each half-year to that account, they would not scruple to ask for it. He could not undertake to say they would put down steel sleepers on the railway all at once, although, of course, this would diminish any chance of fire. Their fares were pretty low already, and it must be remembered that a great competitor had power to do the same thing.

The report was adopted.

Electric and General Investment Co., Ltd.

THE nineteenth ordinary general meeting of the shareholders of this company was held on Tuesday at Winchester House, Old Broad Street, Mr. J. B. Braithwaite in the chair.

In moving the adoption of the report (ELECTRICAL REVIEW, p. 147), the CHAIRMAN said, that as the shareholders were aware, the company was a finance one especially connected with electrical investments, and the past year had been one in which there had been little or no finance going on for electrical securities, and it had been a year in which electrical investments had been somewhat out of favour. Under those circumstances the opportunities which they had had for carrying on profitable business had been very much curtailed, and they had been obliged to fall back almost entirely upon revenue from investments and their remuneration as trustees. There was one satisfactory point in the report, which was that it showed that, apart from their ordinary financial profits, the reveume from investments and trustee fees was sufficient to provide interest on their preference shares and their expenses, leaving a small balance of £568, which they proposed to add to the contingencies account,

raising that to £67,556. They proposed to make a distribution of £10 a share to each founder's share and to pay 6d. a share on the ordinary shares. He thought, on the whole, they might congratulate themselves that their company, throughout the whole of its career, had done well. They had now been established for 18 years, and during that time they had distributed in dividends on each £1 ordinary share, £4 8s. 7½d. from the company and 7s. from the reserve, making a total of £4 15s. 7½d., or 475 per cent. That worked out at about 26½ per cent. over the whole period of 18 years. During the same period the founders' shares of £5 had each received the sum of £707—£546 5s. from the company and £160 16s. from the founders' share reserve, so that those of them who were shareholders had had no cause to complain of the profitable character of their investments, and he saw no reason to doubt that as soon as business improved in the direction in which they were specially interested, they would again make similar profits.

MR. EMILE GARCKE seconded the motion.

The CHAIRMAN, in reply to a SHAREHOLDER, said he regretted that a certain section of the founders' shareholders refused to concur absolutely in the scheme of reconstruction which the directors put forward, and he was afraid he could not hold out any hopes that they would alter their attitude.

The report was then adopted.

Crompton & Co., Ltd.

THE twentieth annual meeting of the shareholders of this company was held on Monday, at Salisbury House, Mr. John Trotter presiding.

The CHAIRMAN, in proposing the adoption of the report (ELECTRICAL REVIEW, p. 148), said he thought they might fairly claim that the results had not been unsatisfactory, seeing that they had been obtained under great difficulty, as the condition of the industry was not in a satisfactory state. They had been suffering for some years past, and were still suffering from over-production and low prices. As showing how prices had fallen, he might say that their own price and that of other manufacturers in the case of standard pattern machines had fallen between 16 and 25 per cent. during the last three years. They would understand that great reductions had been effected in their manufacturing cost to enable them to still sell those motors at a profit, and they would be able to realise what effect an increased turnover had had in producing those results. To give them an example, he had in his mind a dynamo, for which in 1901 they booked an order in competition for the sum of £2,794. By improved design and cheaper manufacture they could now sell at, and the market price for such a machine was £1,035. He thought it was creditable to their engineering staff that they had been able to adapt themselves to such a condition of things. That fact would give them some idea of the keen competition that existed in this country at the present moment in their trade. They had done their very best to keep up prices, and all along they had set their face against the ridiculous and ruinous "cutting" that prevailed. They were constantly refusing orders at other manufacturers' prices, because they were below what they considered a proper and legitimate price. Despite the desperately low prices, if they could get a sufficient amount of business they could still obtain a triflingly higher price than other people, because of the excellence of their work. It was, therefore, their constant endeavour to turn out good honest work, and in the case of any trouble whatever, to give immediate satisfaction to any customers who had a grievance. It was very satisfactory to be able to state, as they did in the report, that the output from the company's works at Chelmsford during the financial year showed a large advance over that of any previous year, and that at the same time further economies in the cost of manufacture had been introduced. That was a confirmation of the policy that the board revealed to them a few years ago, of extending their works in order that they might be able to obtain an increased output and correspondingly cheapen their cost of manufacture. That policy had had the effect they desired—they had never before turned out such a large quantity of goods, and not only so, but owing to the activity of their sales department they had been able to sell their output, and although they had done so much more their stock was reduced from what it used to be. That was very important, because it showed that they could turn over their stock more frequently and show a satisfactory condition of things in spite of the competition. The contract department had been very satisfactory, but it was most desirable that they should not be dependent solely on that department. The increase of activity at Chelmsford and the profits that were being made there was a very satisfactory feature in the company's history. It saved them from taking undesirable contracts simply to keep the business going. Their larger business demanded larger capital. Some two years ago the borrowing powers of the directors were increased, and at that time he said that they had no idea of permanently increasing the capital. To provide, however, for the rapidly increasing business, they would sooner or later have to get in some more permanent capital—say to the extent of about £50,000. They had not determined upon any course yet, as there was no immediate necessity, but he was certain that if they were to continue their present policy of doing a very large business, it would be cheaper to have more permanent capital than to have to rely upon the money market. Turning to the accounts, the chairman said that the stock showed a decrease of £11,000. Investments in other companies had increased by £13,500, part of which was due to the payment they had to make in connection with the guarantee to the Electric Supply Corporation. That Corporation was going on well—not as fast as they could wish, but he had reason to believe it had done very well, especially in connection with Dumbarton, where they had connected up their station with the tramways. The reserve fund account stood at £20,900, and they intended to increase it by £8,000, making it £28,000. That was a respectable figure, but he hoped to see it much larger. The net result was a profit balance of £28,000, against £30,000 last year—not quite so good, but still it was the second best in the company's history, and, in view of the difficulties of conducting business in the electrical world, he did not think it was unsatisfactory. They proposed this year to set aside £2,000 for doubtful debts, which was rather a larger amount than usual, and to add £8,000 to the reserve, which left sufficient to pay 5 per cent. dividend, and to carry forward £6,103, which was slightly more than was brought into the account.

COL. CROMPTON, in seconding the motion, said he considered it spoke volumes for the skill and energy of the staff, that they should have been able to present such a satisfactory report. It was the misfortune of the electrical profession that it was so go-a-head, that there were so many bright brains engaged in attempting to improve matters, that they never could have the same feeling of security in their present patterns and designs, as was the case with the ordinary engineering profession.

The report was adopted.

National Telephone Co., Ltd.

THE forty-second ordinary general meeting of this company was held on Thursday of last week at Hamilton House, Mr. George Franklin presiding.

In moving the adoption of the report and accounts (ELECTRICAL REVIEW, p. 109), the CHAIRMAN said the board regarded them as eminently satisfactory. The income accrued in respect of the half-year's business was £1,452,825 as compared with £1,315,038 for the corresponding period last year, an increase of £137,787, which was a record. After deducting Post Office royalties amounting to £139,546 as against £125,279 there remained a net income of £1,313,279 as compared with £1,189,739. That income had accrued from 463,869 stations, which was an increase of 16,761 as against the number in the corresponding period of 1907. The working expenses showed an increase of £82,878—from £749,760 to £832,638—which was partly due to the normal growth of the company's business and partly due to exceptional items. There was an increase of £27,629 in maintenance and renewals of lines and instruments which showed that the board were resolved to keep the plant in efficient order. He thought that policy should commend itself to the shareholders, since the purchase price to be paid for the business in 1911, on its transfer to the Post Office, would be based on plant values. Administrative and management charges had increased by £38,178, which reflected the growth of business. The net result for the half-year was £480,641, against £439,979, being an increase of £40,666, and as £596 more had been brought forward, there was an additional sum of £41,257 to be disposed of. They had to place against that £7,518, which went in increased debenture and other interest, £26,433 in extra dividend and £10,000 more to reserve fund, which left a balance of £2 694, which represented the reduced sum carried forward. It was very satisfactory that although half a million of capital had been unproductive, they were able to pay the full 6 per cent. dividend on the new stock, as well as the old deferred stock and to carry £140,000, against £130,000 to the reserve fund. This fund now stood at the considerable figure of £2,264,960. Its main purpose was to cover any possible shrinkage in the capital on the transfer of the company in 1911. They should bear in mind that the capital account consisted of the expenditure on plant and the outlays on the acquisition of various telephonic undertakings from time to time. Yet, on the other hand, they should remember that the company was to be paid on the transfer to the Government on the basis only of the then value of the existing plant, less depreciation. Some shareholders might think that in adding large sums to the reserve fund, the board were making excess provision. That might be so, but however large that fund might be that could make no difference at all to the basis on which the transfer of the business was to be effected, whilst an insufficient reserve fund might imperil the shareholders' capital. The main object of the board was to secure the shareholders' capital. If the fund was too great any excess would remain the property of the shareholders, but if such reserve should prove too little, then they might reasonably have cause for complaint of want of provision on the part of the board. He had noticed that lately some eminent financial authorities had been attempting to forecast the price at which the deferred stock would be paid off in 1911. The board had no responsibility for these statements, and saw no safe ground for such predictions. It might happen that arbitration would be resorted to in order to ascertain the purchase price payable, and, therefore, it would be unwise for the directors to speculate on the subject or do anything which might create false hopes on the one hand, or undue depression on the other. Their view was that with the uncertainty that was before them, the policy of the company required that they should keep a vigilant eye on the expenditure and the possibilities of arbitration. They could not go beyond that. The amount carried forward for unexpired terms was very interesting, as showing the remarkable development of the company. The rentals carried forward had increased from £1,210,117 to £1,314,691, an increase of £104,474 for the half-year. The capital expenditure had increased to £14,042,959, representing the amount expended on their 463,869 stations. That

gave an average cost of £30 5s. 6d. per station. If they added to that, the amount expended on lands and buildings—£685,309, a total of £14,728,269 was reached. The share and debenture-holders had provided of that sum £11,221,593, leaving an excess of capital expenditure of £3,506,676. They might ask how that sum had been provided. They would find in the balance-sheet the answer to that. The first item on the assets side was the capital balance of £3,506,676, the next stock of materials, £365,928, which showed a gratifying reduction of £30,000. The total of the assets in the balance-sheet was £5,157,456, which had been provided for by rentals in advance, £1,187,629; creditors' balances, £935,438; and the reserve fund, £2,664,960, which left a balance of £369,426. That had been appropriated for the dividends, including 6 per cent. per annum on the deferred stock, for the addition of £140,000 to reserve, and for the carrying forward of £10,676. The directors of the company, in conjunction with the Postmaster-General, had adopted the system of measured rates. They had something like 10,000 stations on that system, and it was gratifying that a number of municipalities had adopted the principle of measured service. The company, however, only adopted it in regard to new subscribers, the old ones were left undisturbed. He thought that the system would, at any rate, lead to the shareholders getting a fair and equitable return upon the capital which had now to be spent before the "appointed day." There had been an increase in the number of their staff from 17,421 to 17,946, and the number of shareholders had increased from 12,217 to 13,031. They had 1,513 exchanges, and the number of stations, exchange and private, was 463,869. The present rate of effective calls was 656,755,000 per annum, and of messages, including call and reply 1,313,511,000. The accrued revenue per telephone station worked out at £6 3s. 4d., and the average cost per message to a subscriber was 48d., the average per week, being 2s. 4d., or 4d. per day, including Sundays. Comparing the Post Office system with theirs in December last, the company had 93,020 stations, as compared with 46,355 of the Post Office, and in June the corresponding numbers were 99,068 and 49,690, so that there was only an increase in the Post Office of 3,335 as compared with the company's increase of 6,048.

MR. S. H. SANDS seconded the motion, and after a short discussion, the report was adopted.

Electric Construction Co., Ltd.

THE fifteenth annual general meeting of the shareholders of this company was held on the 20th inst. at Winchester House. MR. W. S. B. MCLAREN presided, and in proposing the adoption of the report (ELECTRICAL REVIEW, page 108), said it showed a very marked improvement upon that of last year. They were not only able to pay last year's preference dividend, but they had every reason to expect that within six months they would pay the dividend for this year also. In spite of the severe depression and competition in the trade, the great excellence and high quality of the company's manufactures had met with their reward, and the works had been kept fairly well employed. Strict care and economy had been exercised, with the satisfactory result that the gross profit on manufacturing and contracting showed an increase of £9,775 upon the previous year. That would have been greater by approximately £1,500, which represented abnormal experimental expenditure, and which the board decided to write off in pursuance of their former policy. As intimated at the last annual meeting, the board resolved to adopt other branches of engineering, and the accounts had already benefited by this departure, a considerable amount of general engineering having been obtained. In common with other consumers they had suffered from the high price of fuel, and the increased cost under this head was not less than £500. As formerly, all expenditure on new lines of machines had been written off, and the whole of the factory equipment had been maintained in the most thorough manner out of revenue. In the opinion of the management the company was better equipped at the present time for the expeditious handling of work than it had ever been before. The dividends on shares in other companies had been reduced by £1,161. Those shares were held in the Electrical Power Storage Co., Ltd., and the Madras Electric Tramways (1904), Ltd. Turning to the debit side of the profit and loss account, they would have noted an increase in general charges of £1,186. The principal changes were increases in salaries of about £400; workmen's compensation, £200; branch offices and agencies, £500. In consequence of the strenuous competition which prevailed, the sales department had continued to receive the close attention of the board, and fresh arrangements had been made for opening up new connections both at home and abroad. The board was satisfied of the wisdom of such a step, although it meant increased expenditure, particularly in the case of foreign agencies, where time must elapse before they could become self-supporting. The result of the year's working was a net profit of £5,932, compared with a loss of £1,442 for 1907. He was glad to say that they began the new financial year under more favourable conditions than formerly, and the board were sanguine that by the end of December they would be in a position to declare a dividend on the preference shares for the past year, and thus get rid of that liability. The financial position as disclosed by the accounts was perfectly satisfactory. They had £16,700 in hand. They had no floating liabilities apart from trade accounts, and those were less than one-half the amount due by sundry debtors, besides their having a very substantial sum in stock in trade and work in progress, viz., £74,000, as compared with £52,000 last year. No profit had been credited on that work, though much of it had really been earned, and it would all come into next year's accounts. The shares in other companies had been reduced during the year by the sale of a portion of the company's interests in the Madras tramways, and a depreciation of £2,000 on the sale had been debited to general reserve fund, leaving the amount at the credit of the fund £28,500. In conclusion, the chairman referred to the satisfactory relations which continued to exist between the board and all grades of the staff and workmen, and said that, being anxious to see the Territorial Army scheme a success, they had offered to recoup the men who put in full compulsory drills the difference between their wages and the Government grant. Thirty-three men had joined the force, and the annual donations by the company would not exceed £12.

MR. P. E. BEACHCROFT, seconded the motion, and the report was adopted.

United River Plate Telephone Co., Ltd.

THE twenty-second ordinary meeting of this company was held at Winchester House on the 21st inst. MR. F. GREEN, who presided, in moving the adoption of the report (ELEC. REV., page 109), said that during the financial year ended March 31st last the company's business had continued to increase. In Buenos Ayres their subway system had increased by 80 squares, and they had completed the underground connection to their Belgrano exchange in one of the most important suburbs. The Libertad Exchange, with about 2,000 subscribers, had been converted to the common-battery system, which was giving excellent results. The new common-battery exchanges in Juncal and Mitre had also been installed, and the work of transferring the subscribers' line had been put in hand. The Avenida district overhead distribution was being prepared for the change over to common battery, and a new board would be installed in this exchange as soon as the lease for the ground floor in the Avenida building expired. Their operations, besides embracing the capital, were spreading widely over the province of Buenos Ayres, and into that of Santa Fé, both of which provinces afforded an immense field of operations for the telephone business. The Rosario trunk line had been completed and opened for public use. The increase in subscribers in the city of Rosario itself had also been satisfactory, and they were there rapidly converting their aerial lines into underground connections. Cordoba was also showing very well as regards increase. Preparations had been made for the opening up at an early date during the present year of offices in several important districts, and the necessary concessions had been obtained from the national and provincial Governments and the respective municipal authorities to connect to the general system the important towns of General Paz (Ranchos), General Belgrano, and Lobos. A further important concession had been granted to them to open an exchange in Dolores. In accordance with the prescriptions of a law recently sanctioned by Congress, all telephone companies joining the capital to a province or joining two provinces together would for the future come solely under the control of the National Government, and the old controversy about territorial jurisdiction had been satisfactorily settled, so far, at least, as their business was concerned. The share capital was the same as last year. The new issue of ordinary shares which was made towards the end of March had been fully taken up. The old 5 per cent. debenture stock had now been replaced by the new 4½ per cent. stock. They had spent £62,932 in capital expenditure during the year. Over and above that sum they had spent £45,396 in substituting underground for overhead lines, and in connection with the installation of the common-battery system. Expenditure of this kind, although of the very greatest value to the company, could not be considered as an addition to capital, and they had, therefore, put it to a special replacement account. As the work proceeded, they would make further additions to this account, and, at the same time, would write it off gradually against revenue. They had during the year under review already written off £25,000 of this sum, so that the actual amount left in the account was now only £20,395 19s. 7d. Their real estate had been increased by £7,579, owing to the erection of the new Central Stores Deposit and the extension of various exchange buildings. Securities were down by £15,846, and the stock of materials was down £12,590, as part of the common-battery plant in stores at the previous balance had now gone into the business. In the profit and loss account, there was an increase in receipts in the River Plate to close on £35,000, while maintenance charges and general expenses were about £12,000 more than for the previous year. The increase in the net profit for the year was £18,746. The directors recommended a final dividend of 5 per cent. on the ordinary share capital, making, with the interim dividend paid on December 31st last, a return of 8 per cent. for the year, free of income-tax.

SIR JOHN GAVEY seconded the motion, and referring to the visit he had paid to the Argentine, expressed his satisfaction with all he saw in connection with the company's business.

The report was adopted.

Metropolitan District Railway.—The directors recommend a dividend on the 4 per cent. guaranteed stock for the past six months at the rate of 1⅞ per cent. per annum. Last year the dividend was at the rate of 1⅝ per cent.

Baker Street and Waterloo Railway.—Subject to final audit, the accounts for the half-year ended June 30th provide for the full dividend of 4 per cent. per annum on the preference shares and a dividend at the rate of ⅞ per cent. per annum on the total ordinary share capital.

Torquay Tramways Construction Syndicate, Ltd.

The report of the directors, covering the period from August 24th, 1905 (the date of incorporation), to December 31st, 1907, showed that the amount standing to the credit of profit and loss account was £2,271 8s. 3d., which the directors proposed to carry forward. About 3½ miles of the tramway were opened for traffic on April 4th, 1907, a further 2¼ miles on November 17th, 1907, and the last portion on April 17th, 1908. The total receipts from April 17th, 1908, to July 2nd, 1908, were £3,659 1s. 2d., or 10·72d. per car-mile. In December, 1907, the Torquay Tramways Co., Ltd., was registered with a share capital of £120,000, with power to issue £60,000 in debentures, all of which would be issued to the syndicate, with the exception of £5,000 debentures, which the contractors had agreed to accept in lieu of cash for additional necessary expenditure not provided for in the contract. Additional cars were necessary to cope with the summer traffic, and this was having the directors' attention. The question of applying for powers to extend the tramways to Paignton was also under consideration. Under the articles of association Mr. W. Herbert Fowler retired, but offered himself for re-election. Messrs. Monkhouse, Stoneham & Co., the auditors, also retired, but offered themselves for re-election.

The second ordinary general meeting of the shareholders in this syndicate was held on Monday at the office, Queen Anne's Chambers, Westminster, Mr. J. T. Jervis presiding.

In proposing the adoption of the report, the Chairman said that the profits had not been quite sufficient to enable them to pay a dividend, but the directors were very satisfied with the state of affairs and the amount of traffic they were getting. At present the number of passengers averaged something like 60,000 a week, but that was nothing compared with what they expected during the next two months, which would embrace the holiday season. Up to December 31st last they had taken £8,096, and from the commencement of this year to July 23rd, the receipts had amounted to £7,000, which was very good indeed, especially when it was remembered that the best part of the year was yet to come. The total number of passengers carried this year was 1,292,673, which was a very good return. The average takings per day were between £50 and £60. On July 23rd they took £63 8s. 2d., while on the two holidays Easter Monday and Whit Monday, the receipts totalled respectively £168 6s. 10d. and £146 2s. 10d. They would undoubtedly do considerably better than either of those days on August bank holiday. It must be remembered that the route had only been open throughout since July 17th, and therefore so far they had not had a fair chance of seeing what the traffic was likely to be, but he hoped to have some good figures to show them at the next meeting.

Mr. Glendinning, a shareholder, seconded the motion, and asked what was the cost of operating per car-mile.

Mr. Cownie said that there had been many difficulties in connection with the surface contact system on which the tramways were run, which had caused considerable delay, and during the continuance of those difficulties the expense of operating was very heavy. Now that the difficulties had been successfully overcome, the expenses had come down very considerably, and for the last month or two had averaged about 7d. per car-mile. Their manager, however, expected to reduce the cost still further. They were paying between 1½d. and 1¾d. for current, and were taking 2·06 units per car-mile. Of course, the gradients of Torquay were pretty bad, and even with the overhead system he doubted whether they would be able to work with less than 2 units per car-mile. They hoped to get the operating costs down to somewhere in the neighbourhood of 6d. per car-mile before they had finished. With regard to the receipts they had shown a considerable improvement so far this year, and he reckoned they would amount to £20,000 for the 12 months. With the overhead system there was no doubt that they would have been able to make very good profits indeed, but they had been obliged to use the surface-contact system, which was more expensive than they had anticipated.

The report was adopted.

Anglo-American Telegraph Co., Ltd.

The report of the directors for the half-year ending June 30th, shows that the total receipts, including the balance of £2,478 13s. brought forward from the last account, amounted to £195,258. The traffic receipts show a decrease of £15,625, as compared with the half-year ended June 30th, 1907. The working expenses of the half-year, as shown by the revenue account, amounted to £73,295 18s., being a decrease of £1,467, as compared with the corresponding period of 1907. The directors, under the powers conferred upon them by the articles of association have, before declaring the net profits, set apart the sum of £10,000 (not £5,000 as reported last week) to the renewal fund, leaving a balance of £111,962 13s. Quarterly interim dividends of 15s. per cent. on the ordinary stock, and of £1 10s. per cent. on the preferred stock, were paid on May 1st, 1908, absorbing £52,500, and second quarterly interim dividends of 15s. per cent. on the ordinary stock, and £1 10s. per cent. on the preferred stock, amounting to £52,500, will be paid on August 1st, 1908. The balance of £6,962 13s. will be carried forward to the next account. The same dividends were paid last year.

Siemens Brothers Dynamo Works, Ltd.—According to the *Financial Times* the accounts for the year 1907 shows a credit balance of profit and loss account of £1 416.

British Thomson-Houston Co., Ltd.—The report of the company for the year ended March 31st, 1908, presented at the meeting yesterday, stated that under the terms of the trust deed securing the issue of the company's debentures the company had to pay to the trustees on February 28th last the sum of £3,339, to be applied by them in purchasing debentures in the market. Debentures of the par value of £1,160 were purchased prior to March 31st (the end of the year under review), and since the closing of the books the trustees had purchased an additional amount of £2,400, making the total par value of debentures retired £3,560. The trading profit for the year, after deducting general and technical expenses, discounts, debenture and other interest amounts to £28,038. The whole of this profit, with the exception of £1,394 carried to the balance-sheet, has been applied, as shown in the profit and loss account, to various depreciations. The amount carried forward last year was £1,071, which added to the above amount of £1,394 makes the total carried forward this year £2,466. On the balance-sheet of last year the balance of the excess cost incident to the establishment of the manufacturing business of the company amounted to £16,707, £51,000 having been previously written off. Nothing was added to this account during the year, and the directors have decided to write off a further sum of £6,707, leaving a balance of £10,000, which will be written off from time to time until finanally disposed of. The directors record with regret that during the year Mr. W. A. McArthur resigned as chairman and director of the company. It is not proposed to fill the vacancy on the board at present, and Mr. J. F. Nauheim has been elected to act as chairman of the company.

Stock Exchange Notices.—Applications have been made to the Stock Exchange Committee to appoint a special settling day in, and to grant a quotation to:—

British Aluminium Co., Ltd.—Further issue of 20,000 "A" 6 per cent. cumulative preference shares of £5 each, fully paid.

And to allow the following securities to be quoted in the Official List:—

Durham Collieries Electric Power Co., Ltd.—£150,000 5 per cent. debentures.
Mexican Light and Power Co., Ltd.—$1,500,000 7 per cent. cumulative convertible preference shares of $100 each, fully paid.
United Electric Tramways of Monte Video, Ltd.—67,200 ordinary shares of £5 each, and 70,000 6 per cent. cumulative preference shares of £5 each (special application).

Bristol Tramways & Carriage Co., Ltd.—An interim dividend at the rate of 6 per cent. per annum for the half-year ended June 30th has been declared. Last year the dividend was 8½ per cent.

Brompton and Kensington Electricity Supply Co.—The directors announce an interim dividend for the half-year to June 30th at the rate of 9 per cent. per annum on the ordinary shares, the same rate as last year.

Imperial Tramways Co., Ltd.—An interim dividend at the rate of 8 per cent. per annum for the half-year ended June 30th has been declared, the same rate as last year.

Liverpool Overhead Railway Co.—The accounts of this company for the past half-year show an available balance of £7,206 16s. The directors have resolved to recommend payment of a dividend at the rate of 5 per cent. per annum, as last year, on the (1892) preference shares, which will absorb £3,000, and carry forward a balance of £4,206 16s.

Electric Supply Co. of Berlin.—According to the *Financial News*, the board of directors of the Elektrische Lieferungs A.G., of Berlin, has convened an extraordinary general meeting with a view to obtaining the necessary authorisation for the increase of the capital of the company from 5,000,000 to 15,000,000 marks.

City of Buenos Ayres Tramways Co.—A dividend of 1s. 3d. per share for the quarter ended June 30th has been declared, the same rate as last year.

Central London Railway Co.—The directors have declared dividends for the half-year at the rate of 3 per cent. on the undivided ordinary stock, 4 per cent. on the preferred ordinary stock and 2 per cent. on the deferred ordinary, carrying forward £29,125. The same rates were declared last year.

British Columbia Electric Railway Co., Ltd.—The directors announce a dividend at the rate of 5 per cent. per annum in respect of three months ended June 30th, 1908, together with an additional dividend at the rate of 1 per cent. per annum for the same period.

Chelsea Electricity Supply Co., Ltd.—The directors have declared an interim dividend of 4 per cent. per annum (2s. per share) on the ordinary shares for the past half-year. The same dividend was paid last year.

Great Northern, Piccadilly and Brompton Railway.—Subject to final audit, the accounts for the half-year ended June 30th provide for the full dividend at the rate of 4 per cent. per annum on 35,704 shares, being the ordinary shares which are converted into preference shares, as from July 1st, 1908, and a dividend of ¾ per cent. per annum on the total ordinary share capital, carrying forward £4,886 to next half-year.

Charing Cross, Euston and Hampstead Railway.—Subject to final audit, the accounts for the half-year ended June 30th, 1908, show net revenue sufficient to pay the interest on the total authorised debenture capital, carrying forward £832 to next half-year.

ELECTRIC TRAMWAY AND RAILWAY TRAFFIC RETURNS.

Locality.	Fortnight ended.	Receipts for the fortnight. £	Receipts for the fortnight. £*	No. of wks.	Total to date. £	Total to date. £*	Route miles open.	Inc.
Aberdeen	July 22	3,329	— 456	8	11,569	— 631	14·4	..
Ayr	,, 25	1,348	— 188	10	3,976	— 270	8	..
Bath	,, 25	1,695	— 94	29	20,376	— 1,398	18	..
Belfast	,, 17	7,190	—1,350	16	57,655	— 647	37	..
Birkenhead	,, 26	2,221	+ 13	17	18,268	+ 775	13·52	..
Birmingham Corp.	,, 18	12,865	+ 609	16	100,744	+ 5,194	56·46	..
†Blackburn	,, 15	1,119	— 55	16	18,845	+ 1,079	14·13	..
†Blackpool Corp.	,, 23	1,971	— 180	..	18,441	+ 983	11·87	..
,, —Fleetw'd.	,, 25	2,147	— 352	3	3,794	— 381	6·25	..
Bolton	,, 26	4,841	— 128	17	40,479	+ 1,644	26	..
Bournemouth	,, 22	3,427	— 389	16	26,582	— 1,182	21·72	..
Bradford	,, 18	9,463	— 502	16	75,311	+ 629	54·9	1
Brighton	,, 26	2,091	— 47	17	15,142	+ 156	9·5	..
Bristol	,, 24	10,962	+ 255	..	..	..	12·21	..
Brit. Elec. Trac. Co.								
Airdrie	,, 17	471	+ 8	28	6,346	+ 80	3·65	..
Barnsley	,, 17	350	+ 19	,,	4,891	+ 306	..	..
Barrow	,, 17	552	— 107	,,	6,693	— 166	5·37	..
Cavehill	,, 17	228	— 137	,,	2,499	+ 143	..	..
Devonport	,, 17	893	— 151	,,	12,621	— 46	8·85	..
Gateshead	,, 17	2,097	— 14	,,	28,300	+ 288	11·25	..
Gravesend	,, 17	465	— 97	,,	5,787	— 834	5·5	..
Greenock	,, 17	991	— 526	,,	14,551	— 3,988	7·25	..
Hartlepool	,, 17	548	— 151	,,	6,440	— 1,810	6·72	..
Kidderminster	,, 17	299	— 7	,,	2,975	— 139	..	..
Leamington	,, 17	398	+ 27	,,	4,454	+ 243	3	..
Merthyr	,, 17	429	— 12	,,	5,867	+ 51	2·9	..
Metropolitan	,, 17	12,235	+1,376	,,	154,854	+30,772	22	..
Middleton	,, 17	757	— 87	,,	10,068	+ 378	8·5	..
Mid. Joint Com'tee	,, 17	11,817	— 331	,,	160,781	— 570	..	..
Oldham—Ashton	,, 17	1,195	— 53	,,	16,685	— 23	9·13	..
Peterborough	,, 17	879	..	,,	3,465	+ 77	5·31	..
Potteries	,, 17	3,607	— 69	,,	51,292	— 430	29	..
Rothesay	,, 17	800	— 878	,,	4,217	— 842	2·75	..
Southport	,, 17	681	— 96	,,	7,503	— 348	8·17	..
S. Metropolitan	,, 17	1,676	— 128	,,	21,744	+ 594	..	..
Swansea	,, 17	1,980	+ 1	,,	25,578	+ 1,817	5·5	..
Tynemouth	,, 17	606	— 215	,,	5,619	— 474	3·75	..
Weston-s-Mare	,, 15	528	— 50	,,	2,627	— 47	3	..
‡Worcester	,, 17	539	— 9	,,	7,568	+ 37	5·75	..
Wrexham	,, 17	210	— 3	,,	2,808	+ 16	..	..
Yorks. Wool. Dist.	,, 17	1,753	— 252	,,	25,469	— 1,127	17	..
Miscellaneous	,, 17	428	— 42	,,	5,585	— 452	..	..
Burnley	,, 25	2,721	+ 181	..	..	..	7·5	..
Burton-on-Trent	,, 26	591	— 128	17	4,628	— 380	6·5	..
Bury	,, 19	2,389	— 71	15½	19,385	+ 1,762	10·5	..
Cardiff	,, 18	4,582	—2,196	16	34,911	— 934	..	..
Carlisle	,, 25	426	— 27	30	5,058	— 4	..	..
Chatham and Dist.	,, 23	1,585	— 162	29	21,298	+ 491	14·37	1·58
Cork	,, 23	1,044	— 106	29	13,109	— 497	9·89	..
†Croydon	,, 17	1,410	— 159	16	23,044	+ 102	11·25	..
Darlington	,, 25	411	— 35	17	3,881	— 248	..	..
Darwen	,, 24	538	+ 15	16	4,349	— 8	4·36	..
Dover	,, 18	596	+ 21	16	3,514	— 165	14·75	..
Dublin	,, 24	11,368	—3,921	..	19,745	— 5,766	54·25	5·5
Dundee	,, 22	2,449	— 84	9⅔	12,089	+ 800	14·5	..
East Ham	,, 25	1,706	— 238	17	14,595	— 831	7·75	..
Exeter	,, 24	703	— 46	17	5,328	+ 138	5·5	..
Glasgow	,, 25	31,446	+ 142	8	187,464	+ 1,944	89·25	1
Hastings	,, 23	2,294	— 340	..	..	..	..	..
Huddersfield	,, 25	3,156	— 193	17	27,642	+ 649	23·5	·5
Hull	,, 25	5,017	+ 275	17	40,595	+ 133	13	..
Ilkeston	,, 22	299	— 2	16	2,322	— 51	3·5	..
Ipswich	,, 25	915	— 67	17	6,717	— 69	10·5	..
Kilmarnock	,, 18	304	— 50	9	1,422	— 139	4·25	..
Lan'kshire Trm Co.	,, 23	2,921	— 150	29	37,899	+ 3,335	15·82	..
Lancashire United	,, 22	2,817	— 124	29	38,069	+ 2,067	39	1
Leeds	,, 18	16,534	+3,003	16	107,867	+ 5,495	96·75	·25
Leicester	,, 25	4,740	— 2	..	..	..	..	..
Leith	,, 18	1,185	— 150	9	5,189	— 176	6	..
Liverpool	,, 18	22,196	—1,042	29	306,356	— 2,509	104	..
‡L.C.C.	June 27	73,086	+8,517	12⅞	434,967	+46,043	119·5	6
London United	July 25	15,067	—1,900	..	189,824	— 2,719	..	..
Lowestoft	,, 25	565	— 2	43	7,410	+ 148	3·5	..
†Manchester	,, 18	31,020	— 445	16	240,767	+10,610	86	11
Newcastle	,, 25	7,548	— 593	17	66,796	— 4,364	..	..
Newport	,, 18	1,754	— 27	16	10,846	— 842	14·5	..
Northampton	,, 24	972	+ 23	16⅔	7,862	+ 478	5·5	..
Oldham	,, 26	4 141	— 129	18	35,488	— 584	23·75	..
†Pontypridd	,, 4	338	+ 68	14	4,924	+ 1,203	5	1·75
Portsmouth	,, 25	2,891	— 245	16	33,977	+ 42	14·5	..
†Preston	,, 15	777	— 18	..	..	..	..	..
†Reading	,, 16	645	— 28	..	9,675	+ 172	12·25	..
Rotherham	,, 23	1,187	— 1	15⅔	10,046	+ 196	10	·66
Salford	,, 20	9,629	— 242	16	76,684	+ 628	38·9	..
Sheffield	,, 26	11,275	+ 357	17⅔	99.632	+ 26	36·25	·5
Southampton	,, 22	2,291	+ 56	16	17,731	+ 1,345	..	..
Southend-on-Sea	,, 22	1,071	+ 26	17	6,807	+ 453	..	..
Sunderland	June 28	2,526	— 778	13	15,009	— 3,369	..	..
Swindon	July 22	275	— 44	..	..	..	4·4	..
Tyneside	,, 22	840	— 176	3	1,268	— 162	8·87	..
Wallasey	,, 11	1,944	+ 178	14⅓	13,251	+ 795	8·72	·22
Walthamstow	,, 25	1,350	— 111	17	11,883	+ 886	9	..
West Ham	,, 16	4,398	— 472	16	35,881	— 2,231	14·7	..
Wolverhampton	,, 22	1,747	— 88	16	14,194	— 148	13·6	..
Baker St.-Waterloo	,, 25	6,020	+1,365	4	12,080	+ 1,935	4·25	1
Cen. London Rly.	,, 25	15,578	+5,276	4	29,806	+ 8,015	5·77	..
Char. +, Eus. Hamp.	,, 25	6,515	+1,415	4	13,200	+ 2,755	7·76	..
City & S. Lon. Rly.	,, 26	5,435	— 886	4	11,722	— 1,015	7·3	1·05
Dublin-Lucan Rly.	,, 24	296	— 33	3	500	— 49	7	..
G.N. and City Rly.	,, 25	2,564	— 764	4	5,462	— 1,306	3·5	..
G.N., P'dy. & Brmtn.	,, 25	10,505	+2,260	4	21,175	+ 4,085	9·25	·25
L'pool Overh'd Rly.	,, 26	2,965	— 643	4	5,869	— 956	6·8	4·3
Mersey Railway	,, 25	3,694	+ 226	4	7,329	+ 20	4·5	..
Metropolitan Rly.	,, 26	32,432	+1,541	4	64,920	+ 1,672	24·5	..
Met. District Rly.	,, 25	18,491	+3,072	4	37,000	+ 5,044	24	..
Anglo-Argentine	,, 22	46,679	+2,846	20	698,786	+67,804	45	..
§Auckland	June 29	11,083	+ 926	24	70,669	+ 7,131	20·92	1·72
Bombay (B.E.T.)	July 2	4,447	+ 690	26	62,504	+12,428	..	..
§Brisbane	June 30	13,360	+ 860	..	..	..	..	..
†Buenos A. & Belgr'o.	July 1	3,664	+ 507	26	98,675	+ 1,116	..	..
Calcutta	,, 25	6,118	— 284	..	..	..	..	..
§Cape Electric T.Ld.	May	12,552	..	..	..	..	..	..
§Geneva	June	8,804	+ 464	..	..	..	..	..
§Kalgoorlie, W.A.	,,	4,076	..	26	23,055	..	20·5	..
Madras	July 15	1,188	+ 8	28	16,271	+ 1,498	12·75	..
Montevideo	June	16,519	+2,597	52	160,490	+24,453	..	..
†Perth (W.A.)	July 24	2,749	— 6	30	41,814	— 751	25·48	..

Compared with the corresponding period of 1907. † One week only.
‡ Includes horse, steam and other receipts. § One month.

STOCKS AND SHARES.

Tuesday Evening.

This week it is the Home Railway dividends that have aroused most attention in the investment markets of the Stock Exchange. There is vague talk of a rise, instead of the expected fall, in the Bank Rate, but money continues cheap. There is still little indication of the glut of new issues coming to an end, although with the August holidays so near at hand, promoters will perforce be relaxing very soon their efforts to get the public to subscribe to fresh emissions.

Seeing that underwriters have recently been obliged to take up about 90 per cent. of their liabilities in most cases, it seems quite time that they also should have a holiday as well as the school children.

The Central London has declared dividends at the rate of 4 per cent. on its Preferred and 3 per cent. on the Ordinary, with the intimation that there would be enough to leave 2 per cent. for the Deferred, which does not become payable until the end of the year. Some chroniclers fell into the not unnatural error of supposing that the last-named dividend had been actually declared for payment now, but this is not the case. The Preferred stock has lost a point, and the Ordinary failed to rally, although the result is quite as good as anyone expected.

City and South London fell ½ to 33¼. Great Northern and City Preferred changed hands at 17s. 6d. on Monday. Metropolitan Consolidated rose a point upon the report, which speaks cheerfully of the prospects of better traffics, because of the Exhibition, in the current six months. The company has declared dividends at the rate of 10 per cent. on the Consolidated, and 2¾ per cent. on the Surplus Lands stocks.

Districts at 12 have advanced to a small extent.

The dividend announcements make no difference to prices in the electricity supply section. Metropolitan Ordinary shares are to receive an interim dividend of 2s. 6d., *i.e.*, at the rate of 5 per cent., but the quotation kept at 4⅞, and Chelseas at 3¼ are unaltered by the announcement of the regular distribution; Westminster Preference slightly improved.

British Columbia Electric Railway Preferred Ordinary have put on a point, because of the increase of 1 per cent. in the dividend. A feature in the traction department is the flatness of Calcutta Trams, which show a loss of 10s. at 5. This is due to disappointment with the recent traffics, the new extension not swelling receipts as much as was hoped. Moreover, a block of shares, said to be on account of a deceased holder, overhangs the market. The Preference shares are ½ lower. London United Preference have drooped.

Last week's spurt in National Telephone stocks has been followed by a natural recession, a natural sobering of the lofty optimisms already recorded here. From 122 the price of the Deferred crumbled to 118, but another reaction took the price a point higher again, to 119. The Preferred stock is 1 lower. Chili Telephones have further improved upon their previous strength, and even Marconi's, at 7s. 6d., are a little better. American Telephone and Telegraph Capital stock has again started soaring, this week seeing a rise of 4 points, attributed to the issue of the report.

Telegraph issues display a general quietude. Eastern Extensions are ⅛ lower, and West India shares shed 1/16. Anglo-American Deferred has fallen, but none of the movements are of any special significance. A few Globe Telegraph Preference came on offer, and the price was accordingly lowered half-a-crown.

Industrials are also without feature. British Aluminiums are rather a weak market, upon the poor results achieved by the recent new issue of Debenture stock. Callender's Debenture stock has recovered, but beyond this the telegraph manufacturing descriptions are without any change.

Brush Electrical Engineering Co., Ltd.—An extraordinary general meeting of this company was held on Monday at the offices, 112, Belvedere Road, S.E., Lord Vaux of Harrowden presiding, at which the following resolutions were passed:—

1. That the fully-paid non-cumulative 7 per cent. preference shares of the company be consolidated in such a manner that every three of the existing fully-paid non-cumulative 7 per cent. preference shares of 6s. 8d. each shall constitute one fully-paid non-cumulative 7 per cent. preference share of £1 each.

2. That the fully-paid ordinary shares of the company be consolidated in such a manner that every three of the existing fully-paid ordinary shares of the company of 6s. 8d. each shall constitute one fully-paid ordinary share of £1 each.

3. That each of the 74,268 unissued ordinary shares of £2 each in the company be sub-divided into two ordinary shares of £1 each.

Westminster Electric Supply Corporation, Ltd.—The directors announce an interim dividend for the half-year ended June 30th, 1908, at the rate of 10 per cent. per annum, the same as last year.

SHARE LIST OF ELECTRICAL COMPANIES.

TELEGRAPH AND TELEPHONE COMPANIES.

Present Issue.	NAME.	Stock or Share.	Dividends for the last four years. 1904.	1905.	1906.	1907.	Closing Quotations July 21st.	Closing Quotations July 28th.	Business done week ended July 28th, 1908. Highest	Lowest.	Rise + or Fall —	Present Yield per cent. £ s. d.
25,000	Amazon Telegraph Co.'s shares, Nos. 1 to 25,000	10	Nil	Nil	Nil	Nil	2 — 3	2 — 3	48/9	..	..	Nil
143,300	Do. do. 5 % Debs., Nos. 1 to 1,250 Red.	100	Nil	5 %	5 %	5 %	86 — 89	86 — 89	..	..	..	5 12 4
$131,551,400	American Telephone & Telegraph, Cap. Stock ..	$100	7¼%	7½%	8 %	8 %	119 —123 xd	123 —127	..	..	+4	6 6 0
53,000,000	Do. Collat. Trust, 4% Bonds, 1 to 28,000 and 53,001 to 78,000	$1000	4 %	4 %	4 %	4 %	89 — 92	89 — 92	..	..	..	4 7 0
598,180	Anglo-American Telegraph	Stock	2¾%	3½%	3¾%	3¾%	57 — 60	57 — 60	..	..	..	5 16 8
3,200,910	Do. do. do. 6 % Pref.	Stock	5¾%	6 %	6 %	6 %	103 —104	103 —104	104	103½	..	5 15 5
3,200,910	Do. do. do. Deferred	Stock	Nil	½	1⅜%	1 %	15½ — 16½	15½ — 15¾	15⅞	15⅜	— ⅜	6 7 0
50,000	Anglo-Portuguese Tel., 5 % Mort. Deb. Stock Red.	100	..	5 %	5 %	5 %	100 —103	101 —104	..	..	+1	4 16 2
44,000	Chili Telephone, Nos. 1 to 44,000	5	8 %	8 %	8 %	8 %	7¾ — 8¼	8 — 8¼	..	..	+ ¼	4 14 1
3,383,376	Commercial Cable Stng. 500 year 4 % Deb. Sk. Red.	Stock	4 %	4 %	4 %	4 %	83 — 86	83 — 86	85½	85	..	4 17 0
16,000	Cuba Telegraph	10	5 %	5 %	5 %	6 %	7½ — 8½	7⅞ — 8¼	..	..	..	7 1 2
6,000	Do. 10 % Pref.	10	10 %	10 %	10 %	10 %	15½ — 16½	15½ — 16½	..	..	..	6 1 3
12,931	Direct Spanish Telegraph, Ord.	5	4 %	4 %	4 %	4 %	3 — 3½	3 — 3½	..	..	..	6 3 1
6,000	Do. do. 10 % Cum. Pref. ..	5	10 %	10 %	10 %	10 %	8 — 9	8 — 9	..	..	..	5 11 1
80,000	Do. do. 4½ % Debs.	50	4½%	4½%	4½%	4½%	100 —103	100—103	..	..	..	8 14 10
60,710£	Direct United States Cable	20	3½%	4½%	4⅝%	4½%	18⅜— 19⅞	18½—18¾	18½	18	— ⅛	6 3 8
50,900£	Direct W. India Cable, 4½ % Reg. Deb., 1 to 1,200, R.	100	4½%	4½%	4½%	4½%	98 —100	98 —100	..	..	..	4 10 0
4,000,000	Eastern Telegraph, Ord. Stock	Stock	7 %	7 %	7 %	7 %	132 —135 xd	132 —135	134½	133½	..	5 3 8
2,000,000	Do. 3½ % Pref. Stock	100	3½%	3½%	3½%	3½%	83½— 85½	83½— 85½	85	83⅝	..	4 1 10
1,896,706	Do. 4 % Mort. Deb. Stock. Red. ..	Stock	4 %	4 %	4 %	4 %	101 —103	101 —103	102⅜	101¼	..	3 17 8
800,000	Eastern Extension, Australasia, and China Tele.	10	7 %	7 %	7 %	7 %	12⅞— 13½ xd	12⅝— 12⅞	12⅞	12⅝	— ⅛	5 5 8
752,400	Do. 4 % Deb. Stock	Stock	4 %	4 %	4 %	4 %	101 —103	101 —103	102¼	101¼	..	3 17 8
269,700	East & S. Afric. Tel., 4 % Mt. Db., 1 to 3,000, red. 1909	100	4 %	4 %	4 %	4 %	100 —102	100 —102	..	..	..	3 18 5
200,000£	Do. 4 % Reg. M. Debs. (Mauritius Sub.) 1 to 8,000	25	4 %	4 %	4 %	4 %	100 —102	100 —102	..	..	..	3 18 5
181,127	Globe Telegraph and Trust	10	5⅝%	5½%	5½%	5½%	10½— 10⅝	10½— 10⅝	10⅝	10½	..	5 11 2
181,127	Do. do. 6 % Pref.	10	6 %	6 %	6 %	6 %	13⅜— 13¾	13½— 13¾	13⅝	..	— ⅛	4 7 3
150,000	Great Northern Telegraph, of Copenhagen ..	10	24 %	24%	20 %	20 %	27 — 29	27 — 29	29	28¼	..	6 17 11
19,600£	Halifax and Bermudas Cable, 4½ % 1st Mort. Debs., within Nos. 1 to 1,200, Red.	100	4½%	4½%	4½%	4½%	98 —100	98 —100	..	..	..	4 10 0
17,000	Indo-European Telegraph	25	13 %	13 %	13 %	13 %	56 — 59	56 — 59	..	..	..	5 10 2
$41,380,400	Mackay Companies Common	$100	1 %	2 %	3½%	4 %	66 — 70	66 — 70	..	..	..	5 14 4
$50,000,000	Do. do. 4% Cum. Pref.	$100	4 %	4 %	4 %	4 %	66 — 70	66 — 70	..	..	..	5 14 4
384,190	Marconi's Wireless Telegraph	1	Nil	Nil	Nil	Nil	⅝— ¾	⅝— ¾	..	..	+ 1/16	Nil
72,680	Monte Video Telephone Co., Ltd. Ord.	1	4 %	5 %	6 %	6 %	1 3/16— 1 5/16	1 3/16— 1 5/16	20/-	19/9	..	4 14 1
86,492	Do. do. do. 5 % Pref. ..	1	5 %	5 %	5 %	5 %	1 3/16— 1 5/16	1 3/16— 1 5/16	..	..	..	5 6 8
2,225,000	National Telephone, Pref. Stock	100	6 %	6 %	6 %	6 %	110 —112	109 —111	110⅜	109	..	5 0 0
5,725,000	Do. do. Def. Stock	100	5 %	5 %	5 %	6 %	120½—122½	118 —120	122	118	—2½	4 18 0
15,000	Do. do. 6 % Cum. 1st. Pref.	10	6 %	6 %	6 %	6 %	10⅝— 12⅛	10½— 12½	10⅜	..	..	4 16 0
15,000	Do. do. 6 % Cum. 2nd Pref.	10	6 %	6 %	5 %	6 %	10 — 12	10 — 11	..	..	..	4 3 4
250,000	Do. do. 5 % Non-cum. 3rd P., 1 to 250,000	5	5 %	5 %	5 %	5 %	5⅜— 5⅞	5⅜— 5⅞	5⅞	5⅜	..	4 8 11
2,000,000	Do. do. 3½ % Deb. Stock Red. ..	Stock	3½%	3½%	3½%	3½%	97½— 99½	97½— 99½	98⅛	97½	..	3 10 4
1,716,593	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	100⅜—102⅜	101 —103	..	..	+ ⅛	3 17 8
179,313	Oriental Telep. and Elec. 1 to 171,504, fully paid ..	1	6¾%	7 %	7 %	8 %	1 3/16— 1 5/16	1 3/16— 1 5/16	..	..	..	6 1 11
50,000	Do. do. do. 6 % Cum. Pref. ..	1	6 %	6 %	6 %	6 %	1⅛— 1⅛	1⅛— 1⅛	23/11½	..	..	4 16 0
99,100	Do. do. do. 4 % Red. Deb. Stock ..	100	..	4 %	4 %	4 %	88 — 91	88 — 91	..	..	..	4 7 11
99,400	Pacific & European Tel., 4 % Guar. Debs., 1 to 1,000	10	4 %	4 %	4 %	4 %	97 —100	97 —100	..	..	..	4 0 0
11,889£	Reuter's	8	5 %	5 %	5 %	5 %	7⅛— 8¼	7⅛— 8¼	7 1/16	7⅛	..	4 14 1
99,100	Telephone Co. of Egypt, 4½ % Deb. Red.	100	..	4½%	4½%	4½%	98 —101	98 —101	..	..	..	4 9 1
3,083	Submarine Cables Trust	Cert.	6 %	6 %	6 %	6 %	127 —130	127 —130	..	..	..	4 12 4
100,000	United River Plate Telephone	5	8 %	8 %	8 %	8 %	6⅞— 7⅞	6⅞— 7⅛	..	..	..	5 10 4
40,000	Do. 5 % Cum. Pref., Nos. 1 to 40,000	5	5 %	5 %	5 %	5 %	5 — 5¼	5 — 5¼	..	..	..	4 15 3
30,008	W. Coast of America, 1 to 30,000 & 53,001 to 53,008	2½	Nil	Nil	2½%	2½%	1 3/16— 1 5/16	1 3/16— 1 5/16	..	..	..	3 10 2
150,000	Do. 4 % Debs., 1 to 1,500 guar. by Braz. Sub. Tel.	100	4 %	4 %	4 %	4 %	98 —101	98 —101	..	..	..	3 19 3
207,930	Western Telegraph, Ltd., Nos. 1 to 207,930. ..	10	7 %	7 %	7 %	7 %	13⅜— 14½	13⅝— 14½	13 1/16	13⅜	..	4 19 1
800,000	Do. do. 4 % Deb. Stock Red. ..	100	4 %	4 %	4 %	4 %	99½—101½	99⅜—101½	100⅛	100½	..	3 18 10
88,321	West India and Panama Telegraph	10	Nil	Nil	Nil	Nil	⅜— ½	7/16— ½	12/6	..	— 1/16	Nil
84,563	Do. do. 6 % Cum. 1st Pref.	10	6 %	5 %	6 %	6 %	8 — 8½	8 — 8½	8 1/16	8⅛	..	7 1 2
4,669	Do. do. 6 % Cum. 2nd Pref.	10	Nil	Nil	Nil	£3 6	8¼— 9¼	8½— 9¼	9	..	..	2 9 0
80,000£	D do. 5 % Debs., Nos. 1 to 1,800 ..	100	5 %	5 %	5 %	5 %	99 —102	99 —102	99½	..	..	4 18 0

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.

320,000	Anglo-Argentine Trams, 10 % Nom. Cum. 2nd Pref., 260,008 to 580,097	5	8 %	8 %	8 %	9 %	8⅝— 8½	8½— 8⅞	8⅞	8⅜	+ 1/16	5 1 5
260,007	Do. 6 % Cum. Prefs., 1 to 260,007 ..	5	5⅛%	5⅛%	5⅛%	5⅛%	6 1/16— 6 5/16	6⅛— 6⅜	6⅜	6 1/16	..	4 11 1
266,600	Do. Permanent, 6 % Deb. Stock, 1888	100	6 %	6 %	6 %	6 %	139 —144	141 —145	142½	..	+1½	4 2 9
285,100	Auckland E. Trams, 5 % 1st Mort. Deb. Stock ..	100	5 %	5 %	5 %	5 %	103 —106	103 —106	104½	..	..	4 14 4
880,000	Babcock & Wilcox, 1 to 880,000	1	20 %	20 %	20 %	20 %	3⅛— 3 1/16	3 1/16— 3 1/16	75/-	74/4½	..	5 1 11
100,000	Do. do. 6 % Cum. Pref., 1 to 100,000 ..	1	6 %	6 %	6 %	6 %	1 1/16— 1 1/16	1 1/16— 1 1/16	..	..	..	3 16 10
40,000	British Aluminium, Ord., 1 to 40,000	5	7 %	7 %	7 %	7 %	2⅜— 3½	2⅝— 3½	..	..	..	10 15 4
40,000	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	3½— 4⅜	3½— 4⅜	..	..	— ⅛	7 7 4
20,000	Do. do. "A" 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	4⅛— 5	4⅛— 4⅜	..	..	— ⅛	6 3 1
20,000	Do. do. 4 % Funding Certs.	5	4 %	4 %	4 %	4 %	3½— 4½	3½— 4½	..	..	..	4 14 1
288,200	Do. do. 5 % 1st Mort. Deb. Stock Red.	Stock	5 %	5 %	5 %	5 %	106 —110	106 —110	..	..	..	4 10 11
800,000	Do. do. 5½ % Loch Leven Debs. ..	100	..	..	5⅜%	5⅜%	99 —102	99 —102	..	..	..	5 7 10
400,000	British Columbia E. Rail Def. Ord. Stock ..	100	6 %	6 %	6 %	8 %	124 —129	124 —129	..	..	..	6 4 0
800,000	Do. 5 % Pref. Ord. Stock	100	5 %	5 %	5 %	5 %	108 —112	109 —113	110	..	+1	4 8 6
800,000	Do. 5 % Cum. Perp. Pref. Stock	100	5 %	5 %	5 %	5 %	104 —108 xd	104 —108	106½	105	..	4 12 7
283,000	Do. 4½ % 1st Mort. Debs., 1 to 6,250	40	4½%	4½%	4½%	4½%	99 —102	99 —102	..	..	..	4 8 8
220,000	Do. 4½ % Vancouver Power Debs., 1 to 2,200	100	4½%	4½%	4½%	4½%	100 —103 xd	101 —104	..	..	..	4 7 5
133,301	British Electric Traction	10	6 %	3 %	Nil	Nil	1⅜— 1⅝	1⅜— 1⅝	30/7½	..	..	Nil
161,437	Do. do. 6 % Cum. Pref.	10	6 %	6 %	6 %	3 %	4⅛— 4½	4¼— 4½	..	..	..	6 6 4
1,473,653	Do. do. 5 % Perp. Deb. Stock ..	Stock	5 %	5 %	5 %	5 %	95 — 98	95 — 98	97	96½	..	5 2 0
528,936	Do. do. 4½ % 2nd Deb. Stock Red.	100	4½%	4½%	4½%	4½%	76 — 78	76 — 78	..	..	..	5 14 3
100,000	British Insulated and Helsby Cables	5	8 %	8 %	10 %	..	6⅛— 6⅞	6⅛— 6⅞	..	..	..	7 8 2
100,000	Do. do. 6 % Cum. Pref.	5	6 %	6 %	6 %	6 %	6 — 6½	6 — 6½	..	..	..	4 12 4
500,000	Do. do. 4½ % 1st Mort. Deb. Red. ..	100	4½%	4½%	4½%	4½%	102 —105	100 —103	..	..	..	4 7 5
212,000	British Thomson-Houston 4½ % 1st Mort. Debs. ..	100	4½%	4½%	4½%	4½%	93 — 98	93 — 98	..	..	..	4 11 10
400,000	British Westinghouse 6 % Pref., 1 to 200,000 and 275,001 to 475,000	5	Nil	Nil	Nil	Nil	7/16— 1/2	7/16— 1/2	7/6	..	..	Nil
1,016,353	Do. do. 4 % Mort. Deb. Stock ..	100	4 %	4 %	4 %	4 %	43 — 48	43 — 48	..	..	..	8 6 8
50,000	‡ Browett, Lindley & Co., Ord.	1	Nil	Nil	Nil	Nil	⅜— ½	⅜— ½	..	..	..	Nil
50,000	‡ Do. do. 6 % Cum. Pref.	1	Nil	Nil	Nil	Nil	14/6 to 15/6	14/6 to 15/6	..	..	..	Nil
105,731	Brush Electrical Engineering, Ord., 1 to 105,731 ..	2	Nil	2½%	Nil	Nil	0— ⅛	0— ⅛	..	..	..	Nil
150,000	Do. do. Non-cum. 6 % Pref.	2	6 %	6 %	Nil	Nil	1/16— 1/16	1/16— 1/16	..	..	..	Nil
125,000£	Do. do. 4½ % Perp. Deb. Stock ..	Stock	4½%	4½%	4½%	4½%	70 — 75	70 — 75	..	..	..	6 0 0
125,000£	Do. do. 4½ % Perp. 2nd Deb. Stock..	Stock	4½%	4½%	4½%	4½%	53 — 58	53 — 58	..	..	..	7 15 2
187,610	Calcutta Trams, 1 to 187,610	5	8 %	8 %	8 %	6 %	5½— 6	4⅝— 5½	5	..	— ⅛	4 15 3
80,000	Do. 5 % Cum. Pref., Nos. 1 to 29,830..	5	..	5 %	5 %	5 %	5 — 5⅛	4¼— 5⅛	97/6	..	— ⅛	4 13 0
850,000	Do. 4½ % 1st Deb. Stock..	100	4½%	4½%	4½%	4½%	101 —104	101 —104	101½	..	..	4 6 7
35,000	Callender's Cable Construction shares	5	12½%	15 %	15 %	15 %	9½— 10½	9½— 10½	10 1/16	..	..	7 2 10
40,000	Do. do. 5 % Cum. Pref.	5	5 %	5 %	5 %	5 %	5½— 5⅞	5½— 5⅞	..	..	..	4 5 11
800,000	Do. do. 4½ % 1st Mort. Deb. Stock Red.	Stock	4½%	4½%	4½%	4½%	104½—106⅜	105 —107	105	..	..	4 4 6
491,222	Cape E Trams., 1 to 491,222	1	5 %	Nil	Nil	Nil	1/16— 1/16	1/16— 1/16	..	..	..	Nil
450,000	Castner-Kellner Alkali, 1 to 450,000	1	4 %	6 %	8 %	12 %	1 1/16— 1 1/16	1⅛— 1⅛	28/9	28/3	+ 1/16	8 0 0
215,045	Do. do. 4½ % 1st Mort. Deb. Stock	100	4½%	4½%	4½%	4½%	102 —105	102 —105	..	..	..	4 5 9
1,893,610	Central London Railway, Ord. Stock	Stock	4 %	4 %	4 %	3 %	68 — 71	68 — 71	71	69	..	4 4 6
553,195	Do. do. 4 % Pref. Stock	Stock	4 %	4 %	4 %	4 %	88 — 90	87 — 89	88½	87	—1	4 9 11
553,195	Do. do. Def. do.	Stock	4 %	4 %	4 %	2 %	53 — 56	53 — 56	53	..	..	3 11 0
1,480,000	City and South London Railway	Stock	2½%	1¾%	2½%	2½%	33½— 34½	33 — 34	34½	33	— ⅛	6 5 0

Unless otherwise stated, all shares are fully paid. † A period of nine months. ‡ From Manchester Share List.

Continued on next page

SHARE LIST OF ELECTRICAL COMPANIES.—(*Continued.*)

ELECTRICAL RAILWAY, MANUFACTURING AND INDUSTRIAL COMPANIES.—(*Continued*)

Present Issue.	NAME.	Stock or Share.	Dividends for the last four years.				Closing Quotations July 21st.	Closing Quotations July 28th.	Business done week ended July 28th, 1908.		Rise + or Fall —	Present Yield per cent.
		*	1904.	1905.	1906.	1907.			Highest	Lowest.		£ s. d
85,000	Crompton & Co., Nos. 1 to 85,000	£	2½%	2½%	5 %	5 %	1⅞— 1⅞	1⅞— 1⅞	..	..	..	8 0 0
100,000‡	Do. 5 % 1st Mort. Reg. Debs., 1 to 900 of £100, and 901 to 11,000 of £50 Red.	..	5 %	5 %	5 %	5 %	90 — 93	90 — 93	..	..	..	5 5 11
260,000	Dick, Kerr & Co., 1 to 260,000	1	10 %	10 %	10 %	10 %	1⅛— 1⅜	1⅛— 1⅜	..	..	..	7 5 5
305,000	Do. do. 6 % Cum. Pref., 1 to 305,000	1	6 %	6 %	6 %	6 %	1 — 1¼	1 — 1¼	..	..	..	4 16 0
282,580	Do. dc. 4½ % Deb. Stock	100	4½%	4½%	4½%	4½%	99 —102	99 —102	..	..	..	4 8 3
60,000	Dublin United Trams. (1896), 1 to 60,000	10	6 %	6%	6 %	6½%	12⅜— 13½	12⅜— 13½	..	..	..	4 18 2
59,987	Do. 6 % Pref. between 1 and 60,000	10	6 %	6 %	6 %	6 %	12½— 13½	12½— 13½	13	..	..	4 7 3
99,261	Edison & Swan Utd., "A" shs., £3 pd., 1 to 99,261	5	2½%	4½%	4½%	4½%	⅜— ½	⅜— ½	..	..	..	16 15 8
17,189	Do. "A" shares, 01—017,189	5	2½%	4½%	4½%	4½%	1½— 2½	1½— 2½	..	..	..	8 6 9
319,475	Do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	76 — 79	76 — 79	..	..	..	5 1 3
72,220	Do. 5 % 2nd Deb. Stock Prov. Certs. all pd.	100	5 %	5 %	5 %	5 %	85 — 87	85 — 87	..	..	..	5 14 11
112,100	Electric Construction, 1 to 112,100	2	4 %	Nil	Nil	Nil	½— ⅝	½— ⅝	6/-	..	..	Nil
81,890	Do. do. 7 % Cum. Pref., 1 to 81,890	2	7 %	7 %	7 %	Nil	1½— 2	1½— 2	..	..	..	Nil
25,000	General Electric Co. (1900), 5 % Cum. Pref.	10	5 %	5 %	5 %	5 %	7½— 8	7½— 8	..	..	..	6 5 0
200,000	Do. do 4 % Mort Deb.	Stock	4 %	4 %	4 %	4 %	84 — 87	84 — 87	..	..	..	4 12 0
78,000	Gt. N. & City Rail. Pref. Ord. "A" 4 %, 1 to 78,000	10	4 %	4 %	4 %	¾%	⅜— 1½	⅜— 1½	..	..	..	3 6 8
96,000	Greenwood & Batley, 7 % Cum. Pref.	10	7 %	7 %	7 %	7 %	10½— 10⅝	10½— 10⅝	..	..	..	6 10 8
80,000	Do. do. 5 % Mort. Debs.	100	5 %	5 %	5 %	5 %	102 —103	102 —103	..	..	..	4 17 1
40,000	Henley's (W. T.), Telegraph Works, Ord.	5	15 %	15%	15 %	15%	10½— 11⅛	10½— 11⅛	..	..	..	8 18 10
40,000	Do. do. 4½ % Pref.	5	4½%	4½%	4½%	4½%	5 — 5⅛	5 — 5⅛	..	..	..	4 1 10
150,000	Do. do. 4½ % Mort. Deb. Stock	Stock	4½%	4½%	4½%	4½%	106 — 108	106 — 108	..	..	..	4 3 4
50,000	India-Rubber, Gutta-percha & Telegraph Works	10	5 %	10%	10 %	10 %	15½— 16½	15½— 16½	16	15 1/16	..	6 1 8
37,500	†Liverpool Overhead Railway, Ord.	10	1½%	Nil	Nil	¾%	1⅛— 1⅜	1⅛— 1⅜	..	..	..	3 14 1
10,000	† Do. do. Pref., fully paid	10	5 %	5 %	5 %	5 %	5⅛— 6⅛	5⅛— 6⅛	..	..	..	8 0 0
600,070	London United Trams. (1901), 1 to 50,007	10	6 %	3 %	3 %	3 %	6⅛— 6⅜	6⅛— 6⅜	..	..	..	4 8 11
399,980	Do. do. 60,008 to 100,000	10	6 %	3 %	3 %	3 %	6⅛— 6⅜	6⅛— 6⅜	..	..	..	4 8 11
125,000	Do. do. 5 % Cum. Pref., 1 to 125,000	10	5 %	5 %	5 %	5 %	7 — 8	6½— 7½	6½	..	— ½	6 13 4
1,331,000	Do. do. 4 % 1st Mort. Deb. Stock	100	4 %	4 %	4 %	4 %	79 — 84	79 — 84	79	..	..	4 15 3
5,732,062	Metropolitan Consolidated	100	3 %	2⅜%	1 %	¾%	34½— 35½	36 — 37	37½	34½	+1½	1 7 1
2,640,914	Do. Surplus Lands	100	2½%	2⅜%	2⅜%	2⅜%	67 — 69	67 — 69	68⅜	68¼	..	3 19 9
3,235,000	Do. District	100	Nil	Nil	Nil	Nil	11 — 12	11⅛— 12⅛	12	11¼	..	Nil
314,016	Metropolitan Electric Trams., Defd.	1	Nil	Nil	Nil	Nil	7/16— 9/16	7/16— 9/16	9	..	..	Nil
600,000	Do. do. 5 % Cum. Pref.	1	5 %	5 %	5 %	5 %	1⅛— 1⅜	1⅛— 1⅜	14/6	..	..	6 8 1
350,000	Do. do. 4½ % Deb. Stock Red.	100	4½%	4½%	4½%	4½%	93 — 96	93 — 96	..	..	..	4 13 9
245,500	Potteries E. Trc.	1	5 %	4 %	4 %	4 %	⅛— ¼	⅛— ¼	..	..	..	8 0 0
245,500	Do. 5 % Cum. Pref.	1	5 %	5 %	5 %	5 %	⅛— ¼	⅛— ¼	..	..	..	6 13 4
245,000	Do. 4½ % Deb. Stock	100	4½%	4½%	4½%	4½%	93 — 96	93 — 96	..	..	..	4 13 9
37,350	Telegraph Construction and Maintenance	12	15 %	15 %	15 %	17½%	31 — 33	31 — 33	33½	31	..	6 5 0
150,000‡	Do. 4 % Deb. Bds., 1 to 1,500 Red., 1909	100	4 %	4 %	4 %	4 %	100 —102	100 —102	..	..	..	3 18 5
3,599,200	Undergd. E. R., Lon., 5 % Profit Shar. S. Nts.	..	5 %	5 %	5 %	5 %	40 — 44	40 — 44	40¼	..	..	11 7 4
66,666	Willans & Robinson, 1 to 30,000 & 80,001 to 116,666	1	Nil	Nil	Nil	10 %	⅜— 1½	⅜— 1½	18/3	..	..	8 0 0
66,666	Do. 6 % C.P., 30,001 to 80,000 & 125,001 to 141,666	5	Nil	Nil	..	6 %	2½— 3½	3— 3½	65/9½	65/-	— ½	8 11 5
46,404	Do. 4 % 1st Mort. Deb. Stock	100	4 %	4 %	4 %	4 %	72 — 76	72 — 76	75	73½	..	5 5 3

ELECTRICITY SUPPLY COMPANIES.

15,000	Bromley (Kent) E.L. & P,. 1 to 15,000	5	5⅓%	5⅓%	5⅓%	5⅓%	4⅝— 5	4⅝— 5	..	..	..	5 10 0
70,000	Do. do. 4½ % 1st. deb. stock	100	4½%	4½%	4½%	4½%	94 — 97	94 — 97	..	..	..	4 10 11
30,131	Brompton & Kens. Elec. Lt. Sup., Ord., 1 to 20,000	5	10 %	10 %	10%	10 %	7 — 8	7 — 8	..	..	..	6 5 0
9,869	Do. do. 7 % Cum. Pref.	5	7 %	7 %	7 %	7 %	6⅞— 7⅜	6⅞— 7⅜	..	..	..	4 10 4
886,876	Central Electric Supply 4 % Guar. Deb. Stock	100	4 %	4 %	4 %	4 %	98 — 101	98 —101	..	..	..	3 19 3
80,000	Charing Cross and Strand Electricity Supply	5	8 %	5 %	5 %	5 %	3¾— 4⅛	3¾— 4	..	..	— ⅛	6 5 0
80,000	Do. do. do. 4½ % Cum. Pref.	5	4½%	4½%	4½%	4½%	4 — 4⅛	4 — 4⅛	80/-	..	..	5 0 0
80,000	Do. "City Undertaking" 4½ % Cum. Pref.	5	4½%	4½%	4½%	4½%	3⅞— 4⅛	3⅞— 4⅛	..	..	..	4 17 4
445,736	Do. do. 4 % Deb. Stock Red.	100	4 %	4 %	4 %	4 %	94 — 97	93½— 95½	..	..	— ½	4 3 9
49,486	Chelsea Electricity Supply, Ord.	5	6 %	6 %	4½%	4½%	3 — 3⅛	3 — 3⅛	..	..	..	6 8 7
175,000‡	Do. do. 4½ % Deb. Stock Red.	Stock	4½%	4½%	4½%	4½%	100 —103	100 —103	..	..	..	4 7 5
70,595	City of London Elec. Lighting, Ord. 40,001—110,595	10	6 %	6 %	6 %	6 %	9⅛— 10⅛	9⅛— 10⅛	10	..	..	5 14 3
40,000	Do. 6 % Cum. Pref., 1 to 40,000	10	6 %	6 %	6 %	6 %	12 — 13	12 — 13	..	..	..	4 12 4
400,000‡	Do. 5 % Db. Stk., Scrip. (iss. at 115) all pd.	..	5 %	5 %	5 %	5 %	122 —125	122 —125	..	..	..	4 0 0
800,000	Do. 4½ % 2nd. Db. Stk., Prov. Crts., all pd.	100	4½%	4½%	4½%	4½%	101 —104	101 —104	..	..	..	4 6 7
40,000	County of Durham Electrical Power, Ord.	5	£3 7 0	4 %	4 %	2 %	2⅛— 3	2⅛— 3	..	..	..	3 6 8
50,000	Do. do. do. 5 % Pref.	5	5 %	5 %	5 %	5 %	3⅞— 4⅛	3⅞— 4⅛	..	..	..	5 17 8
40,000	County of London Electric Lighting, Ord. 1—40,000	10	4½%	5 %	5 %	5 %	7⅜— 8⅛	7⅜— 8⅛	7⅜	..	— ⅛	5 17 8
40,000	Do. do. 6 % Pref., 40,001—60,000	10	6 %	6 %	6 %	6 %	10½— 11	10½— 11	10 3/8	..	..	5 9 1
400,000‡	Do. do. 4½ % Deb. Stock	..	4½%	4½%	4½%	4½%	106 —109	106 —109	106⅝	..	..	4 2 7
400,000	Do. do. 4½ % 2nd. Deb. Stock	Stock	4½%	4½%	4½%	4½%	98 —101	98 —101	..	..	..	4 9 1
80,000	Edmundson's Electric Corporation, Ord. Shares	5	7 %	4 %	Nil	Nil	⅛— ⅜	⅛— ⅜	..	..	..	Nil
80,000	Do. do. 6 % Cum. Pref.	5	6 %	6 %	2 %	Nil	¾— 1	¾— 1	..	..	..	Nil
433,000	Do. do. 4½ % 1st Mort. Deb. Stk.	100	4½%	4½%	4½%	4½%	61 — 71	60 — 67	..	..	—2½	6 14 4
10,000	Folkestone, 1 to 10,000	5	5½%	5½%	5½%	5½%	4⅝— 5⅛	4⅝— 5⅛	..	..	..	5 4 9
10,000	Do. 5 % Cum. Pref., 1 to 10,000	5	5 %	5 %	5 %	5 %	5 — 5⅛	5 — 5⅛	..	..	..	4 10 11
90,000	Do. 4½ % 1st Deb. Stock	100	4½%	4½%	4½%	4½%	98 —101	98 —101	..	..	..	4 9 1
15,000	Hove, 1 to 13,000	5	8½%	9 %	9 %	8½%	6 — 6⅛	6 — 6⅛	..	..	..	6 10 9
21,000	Kensington and Knightsbridge Electric Ord.	5	12 %	10 %	10 %	10 %	8 — 9	8 — 9	..	..	..	5 9 7
90,000	Do. do. 4 % Deben. Stk.	Stock	4 %	4 %	4 %	4 %	96 — 99	96 — 99	..	..	..	4 0 10
10,000	London Electric Supply Corporation, Limited, Ord.	3	3 %	4 %	4 %	2½%	⅞— 1⅜	⅞— 1⅜	..	..	..	5 8 1
70,000	Do. do. 6 % Pref.	5	6 %	6 %	6 %	6 %	4⅜— 5	4⅜— 5	..	..	..	6 0 0
74,395	Do. do. 4 % 1st Mort. Deb. Stk. Red.	Stock	4 %	4 %	4½%	4½%	89 — 92	89 — 92	..	..	..	4 17 10
200,000	Metropolitan Electric Supply, 1 to 100,000	5	10 %	10 %	8 %	6¾%	4⅝— 5⅛	4⅝— 5⅛	..	..	..	5 15 7
76,121	Do. 4½ % Cum. Pref. 1—71,106	5	4½%	4½%	4½%	4½%	4⅝— 5⅛	4⅝— 4⅞	98/9	..	..	4 12 4
230,000‡	Do. 4½ % 1st Mort. Deben. Stock	..	4½%	4½%	4½%	4½%	105 —109	105 —109	..	..	..	4 2 7
250,000‡	Do. 3½ % Mort. Deben. Stock Redem.	Stock	3½%	3½%	3½%	3½%	84 — 89	84 — 89	..	..	..	3 18 8
250,000	Midland Electric Corporation, 4½ % 1st Mort. Deb.	100	4½%	4½%	4½%	4½%	94 — 97	94 — 97	..	..	..	4 12 9
87,500	Newcastle-on-Tyne, 1 to 87,500	5	8 %	8 %	8 %	8 %	5⅝— 5⅞ xd	5⅝— 5⅞	..	..	..	6 14 9
87,500	Do. 5 % Pref., 1 to 87,500	5	5 %	5 %	5 %	5 %	5⅛— 5⅜ xd	5⅛— 5⅜	..	..	..	4 13 0
10,852	Notting Hill Electric Lighting	10	7 %	7½%	7½%	7½%	12 — 13	12 — 13	..	..	..	5 15 5
20,000	Oxford, 1 to 96 and 407 to 20,310	5	7 %	7 %	7 %	7 %	5⅜— 6⅛	5⅜— 6⅛	..	..	..	5 19 0
50,000	Do. 4 % Deb. Stock	100	4 %	4 %	4 %	4 %	95 — 99	95 — 98	..	..	— ½	4 1 8
40,000	St. James' and Pall Mall Electric Light, Ord.	5	14½%	12½%	10 %	10 %	7⅜— 8⅛	7⅜— 8⅛	7 3/8	7⅜	..	5 17 8
30,000	Do. do. 7 % Pref. 30,081 to 40,080	5	7 %	7 %	7 %	7 %	6¾— 7⅛	6¾— 7⅛	..	..	..	4 16 7
150,000‡	Do. do. 3½ % Deb. Stock Red.	100	3½%	3 %	3½%	3½%	86 — 90	86 — 90	..	..	..	3 17 9
12,000	Smithfield Markets Electric Supply, Ord.	5	4 %	4 %	Nil	Nil	½— ⅝	½— ⅝	..	..	..	Nil
50,000	Do. do. do. 4 % Deb. Stock	Stock	4 %	4 %	4 %	4 %	70 — 74	70 — 74	..	..	..	5 8 1
65,000	South London Electricity Supply, Ord.	5	4 %	4 %	3 %	4 %	2⅜— 2⅝	2⅜— 2⅝	..	..	..	6 19 2
120,000	South Met. Elec. Lt. & Power, Ord.	1	Nil	2½%	2½%	2½%	⅜— ⅝	⅜— ⅝	..	..	..	3 6 8
117,968	Do. do. 7 % Pref.	1	7 %	7 %	7 %	7 %	1 — 1⅛	1 — 1⅛	..	..	..	5 12 0
200,000	Do. do. 4½ % 1st Deb. Stk.	100	4½%	4½%	4½%	4½%	99 —102	100 —103	..	..	+1	4 7 5
80,000	Urban Electric Supply, Ord.	5	5 %	5 %	5 %	5 %	½— 1⅛	¾— 1⅛	22/9	..	..	16 13 4
50,000	Do. do. 5 % Cum. Pref.	5	5 %	5 %	5 %	5 %	1½— 2⅛	1⅝— 2⅛	..	..	..	10 10 6
200,000	Do. do. 4½ % 1st Mort. Db. Stk. Red.	100	4½%	4½%	4½%	4½%	82 — 85	82 — 85	..	..	..	5 5 11
110,000	Westminster Electric Supply, Ord.	5	14 %	13 %	12 %	10 %	7⅜— 8⅞	7⅜— 8⅝	8¼	..	..	5 14 3
81,979	Do. do. 4½ % Cum. Pref. (Original 5 %—Red. to 4½ % from 31st Dec., 1905)	5	5 %	5 %	4½%	4½%	4⅞— 5⅛	5 — 5⅛	5⅛	5 1/16	+ ⅛	4 1 10

* Unless otherwise stated, all shares are fully paid. † Quotations on Liverpool Stock Exchange. § Interim Dividend.

Bank rate of Discount 2½ per cent., May 28th, 1908.

EXPORTS AND IMPORTS OF ELECTRICAL GOODS DURING JUNE, 1908.

The returns of electrical business for the above month, which are appended below, show a marked decline in value as compared with the first part of the year—a decline which we had expected somewhat earlier. Thus, taking the months of May and June, the exports have fallen from £203,063 to £178,817; the imports similarly have dropped from £156,150 to £122,665; and the re-exports, at £8,534, compare with £12,279 in May. These declines, however, have not as yet caused the export total to fall below the 1907 monthly average, although both imports and re-exports are much below that level.

Of the individual items, the machinery exports have so far been little affected, their total being £82,764, as compared with the May value of £85,011; every other class of export, except batteries, shows a decrease.

Machinery imports are still the most prominent item in that section, with lamps, cables and carbons helping to swell the total.

Registered Exports of British and Irish Electrical Goods from the United Kingdom.*

Country receiving exports and importing.	Electrical goods and appliances.	Electrical cable.	Electric lighting fittings and accessories.	Electric lamps.	Electric meters and instruments.	Electric machinery.	Batteries and accumulators.	Carbons.	Telegraph and telephone material, and electric bells.	Electrically-driven machinery.	Tramway apparatus and materials.	Total.
	£	£	£	£	£	£	£	£	£	£	£	£
Russia, Sweden, Norway and Denmark ...	154	179	70	202	76	3,208	...	40	...	13	...	3,942
Germany	114	8,842	6	11	372	573	17	...	21	...	...	9,956
Netherlands and Java	302	797	12	58	25	354	7	...	...	...	...	1,555
Belgium	99	839	2	5	174	782	...	...	444	...	...	2,345
France	205	...	11	550	20	2,093	...	34	30	...	...	2,943
Portugal, Madeira and Portuguese Africa ...	232	81	47	147	31	724	283	...	8	22	...	1,545
Spain and Canary Isles	50	...	34	...	...	636	8	25	159	...	...	912
Italy and Austria-Hungary	2	...	77	34	585	5,161	5,600	...	131	...	...	11,590
Greece, Roumania and Turkey	162	57	16	...	20	227	...	...	23	...	...	505
Channel Isles, Gibraltar and Malta	51	113	10	5	22	3,871	3	...	...	...	...	4,075
U.S.A. and Philippines	63	47	...	137	78	465	...	2	...	...	...	792
Canada and Newfoundland	263	951	65	91	595	247	75	90	...	...	...	2,377
British West Indies and British Guiana ...	27	...	...	8	...	3,500	65	...	63	19	...	3,682
Mexico, Colombia and Panama	13	31	...	...	3	2,520	...	...	41	...	...	2,608
Peru and Uruguay	19	5	156	4	...	241	32	...	...	...	...	457
Chile	23	26	90	131	179	3,143	...	2	...	...	...	3,594
Brazil	527	759	212	355	...	1,511	70	...	14	45	...	3,493
Argentine	947	2,399	477	291	837	10,874	345	17	73	43	...	16,303
Egypt	160	443	37	7	...	182	20	...	22	6	...	877
British West Africa	5	50	49	11	183	38	20	...	123	...	...	479
Cape of Good Hope	365	1,479	192	318	202	669	14	60	1,341	...	...	4,640
Natal	220	2,014	17	237	191	2,348	178	64	...	...	...	5,269
Zanzibar, Brit. East Africa, Mauritius & Aden	27	50	...	47	9	148	1	34	102	...	...	448
China and Siam	197	385	182	41	279	1,962	20	...	...	...	...	3,066
Japan	76	2,095	10	26	917	7,784	105	...	...	...	...	11,013
Persia	6	...	...	...	...	...	...	...	...	...	...	6
India	4,079	6,185	561	759	435	12,521	314	26	375	2,221	...	27,476
Burmah and Assam	246	882	173	183	7	945	...	13	171	...	...	2,620
Ceylon	63	50	30	86	...	344	8	...	55	23	...	659
Straits Settlements and Fed. Malay States ...	149	2,509	191	338	413	1,436	273	3	207	...	...	5,519
Hong Kong	80	266	19	243	5	2,622	...	2	40	9	...	3,286
West Australia	67	39	131	134	34	1,793	2	8	80	...	...	2,288
South Australia	73	390	...	112	15	909	20	...	2	...	...	1,521
Victoria	1,714	7,141	51	581	...	1,486	734	...	129	3	...	11,839
New South Wales	841	4,061	366	1,580	1,238	5,196	1,470	137	1,340	...	...	16,229
Queensland	605	1,508	68	3	...	235	...	...	59	...	...	2,478
Tasmania	...	...	...	...	...	64	...	...	89	...	...	153
New Zealand	627	2,787	495	320	65	1,952	24	7	...		...	6,277
Total, £	12,853	47,490	3,857	7,055	7,010	82,764	9,678	564	5,142	2,404	...	178,817

Registered Imports into the United Kingdom of Electrical Goods from all Countries.

	£	£	£	£	£	£	£	£	£	£	£	£
Norway, Sweden and Denmark	...	221	...	21	...	1,081	416	26	3,736	...	...	5,501
Germany	1,243	6,813	463	9,135	524	18,470	93	793	1,431	80	...	39,045
Holland	258	5,592	299	13,419	3,268	3,697	272	6,416	269	125	...	33,615
Belgium	787	4,017	516	1,535	181	2,303	56	846	6,098	1,006	...	17,345
France	153	1,396	1,118	992	773	1,228	2,190	3,569	203	89	...	11,711
United States	2,508	246	951	524	...	8,896	310	1,580	10	383	...	15,408
Total, £	4,949	18,285	3,347	25,626	4,746	35,675	3,337	13,230	11,747	1,683	...	122,625

Additional Import: New South Wales, machinery, £40.

Registered Re-Exports of Foreign and Colonial Electrical Goods from the United Kingdom.

	£	£	£	£	£	£	£	£	£	£	£	£
Various countries, mainly as above	1,661	211	...	886	37	3,198	400	413	1,728	...	...	...

Total Exports: £178,817. Total Re-Exports: £8,534 Total Imports: £122,665

Note.—The amounts appearing under the several headings are classified according to the Customs returns. The first and third columns contain many amounts relating to "goods" otherwise unclassified, the latter, doubtless, consisting of similar materials to those appearing in adjacent columns.

* This section does not include telegraph cables and apparatus.

LOCALISING HIGH-RESISTANCE BREAKS IN CABLES.

By J. RYMER-JONES.

(*Continued from page* 125.)

Unsteady Balances.—When the break resistance is unsteady, the balance with R b and R b_1 will also be unsteady, and it will be necessary to approximate these values by adjusting R b and R b_1 until the *spot* swings equally on either side of the zero and *false zero* respectively.

When using the Kelvin galvanometer and balancing with R b, immediately after depressing key K_1 to *earth* point P of the cable, any unsteadiness of the spot must be checked by means of the check-coil (see *Galvanometer* in General Remarks) before allowing K_1 to rise again and observing the cable charge throw C.

Also when measuring the resistance R t of the cable circuit by the direct-deflection method, the extreme limits of several undulations must be noted and the *mean* (d) used for evaluating R t.

Explanatory Remarks.

Principle of the Test.—The *principle* is based on the *cable charge*, and the effect of resistance at the break and testing end in modifying that charge.

The potential of the testing battery falls regularly for every unit of resistance in both the cable conductor and the break in proportion to their respective resistances, but, of course, only the cable portion has any *capacity*. The charge taken up by the cable is equivalent to what the cable core holds when charged by a *mean* of the potentials T and t existing at its two ends, while the testing current is circulating through the above-mentioned parallel circuits. For instance, if the resistance of the cable conductor be equal to that of the break, the potentials of the near and distant ends of the cable conductor are respectively (say) 100 and 50, and therefore the cable portion takes up a charge due to a mean potential of 75, which charge can be measured as already explained; while the remaining half of this circuit—viz., the break resistance—has no capacity for a static charge; and it is this fact, in conjunction with the effect which the total measured resistance (R l) has in modifying the cable charge, and the known distribution of the charge held by every part of a cable having its distant end earthed, which has been utilised to localise the distance of a high resistance break.

Although such a break is impossible of localisation by any known method based only on the resistance of the conductor circuit, yet it causes the cable portion to take a much higher charge than would be the case were the break resistance small; and advantage is, therefore, taken of this, and also of the fact that the higher the break resistance the more cells may be used to increase the charge—subject to the limitation necessary to prevent undue evolution of gas and consequent unsteadiness—to devise an efficient test.

The Advantage of Low Resistance at the Testing End.—The higher the mean potential in the cable portion, the greater the charge, and consequently the more reliable the measurement. For breaks of only moderately high resistance, it is, therefore, advantageous to employ a moderately low galvanometer resistance, or one shunted with a low resistance; and consequently the more sensitive the instrument in other respects the better. On the other hand, if the length of cable in circuit be short, the momentary rush of current to charge it will be small, and for this reason the shunt used for the *balance* should be of a value to ensure a good charge throw.

The advantage of only a low resistance at the testing end of the cable is one reason why the method of joining up the galvanometer coils differentially for *measuring the cable charge* is preferred to the *bridge system*; for although practicable and even desirable in so far as it permits of a galvanometer with a *single coil* being employed, yet a bridge system has the great disadvantage of introducing a high *branch* resistance at the testing end, and thereby appreciably reducing the testing charge taken up by the cable, while at the same time it increases the charge, due to the *cable current*, for which the result has to be corrected.

To ascertain what this *branch resistance* is, with a view to calculate its effect on the cable charge, introduces an unnecessary complication; and the *bridge system*, moreover, does not lend itself to so simple a theoretical explanation of the test. (See *Galvanometer and Resistance of Galvanometer Coil g_1 as shunted* in the General Remarks.)

Moreover, the lower the resistance r (*i.e.*, the resistance of the battery and shunted galvanometer coil g_1) the higher and, therefore, the more constant and reliable will be the condenser throw (c) when charged from point P; because it will not be so much affected by sudden changes in the resistance, due to the generation of gas at the break. For instance, were it possible that $r = 0$ the potential P would clearly be that of the testing battery and remain unchanged, however irregular the break resistance might be.

The Rationale of the Method is as Follows:—Let R t be the total resistance in circuit, including the cable conductor, break resistance, shunted galvanometer coil g_1 (r), and the battery resistance (B r), as calculated by *direct deflection*, or other, method; then $R\,l = R\,t - (r + B\,r)$ (ohms).

Suppose this resistance R l *to be entirely made up of cable* having a mean resistance (r_1) per N.M. of the whole cable as laid, and a mean capacity (f_1) per N.M. as obtained from the factory value as *core*; then the length (L) of this *imaginary cable* will be $\frac{R\,l}{r_1}$; and the total capacity, with the distant end *insulated*, will be $L\,f_1$ mfd.

TABLE I gives the ratio $\frac{f}{F}$ from the testing end, as it increases with every additional 5 units in a cable of 1,000 units, having a uniform capacity and conductor resistance (per N. M., and its distant end to earth — where F = 1.

No. of units from testing end. N	Calculated ratio $\frac{f}{F}$	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$
	(1)		(2)		(3)		(4)		(5)
5	·009975	205	·367375	405	·645975	605	·843975	805	·961975
10	·019900	10	·375900	10	·651900	10	·847900	10	·963900
15	·029775	15	·383775	15	·657775	15	·851775	15	·965775
20	·039600	20	·391600	20	·663600	20	·855600	20	·967600
25	·048375	25	·399375	25	·669375	25	·859375	25	·969375
30	·059100	30	·407100	30	·675100	30	·863100	30	·971100
35	·068775	35	·414775	35	·680775	35	·866775	35	·972775
40	·078400	40	·422400	40	·686400	40	·870400	40	·974400
45	·087975	45	·429975	45	·691975	45	·873975	45	·975975
50	·097500	50	·437500	50	·697500	50	·877500	50	·977500
55	·106975	55	·444975	55	·702975	55	·880975	55	·978975
60	·116400	60	·452400	60	·708400	60	·884400	60	·980400
65	·125775	65	·459775	65	·713775	65	·887775	65	·981775
70	·135100	70	·467100	70	·719100	70	·891100	70	·983100
75	·144375	75	·474375	75	·724375	75	·894375	75	·984375
80	·153600	80	·481600	80	·729600	80	·897600	80	·985600
85	·162775	85	·488775	85	·734775	85	·900775	85	·986775
90	·171900	90	·495900	90	·739900	90	·903900	90	·987900
95	·180975	95	·502975	95	·744975	95	·906975	95	·988975
100	·190000	300	·510000	500	·750000	700	·910000	900	·990000
5	·198975	5	·516975	5	·754975	5	·912975	5	·990975
10	·207900	10	·523900	10	·759900	10	·915900	10	·991900
15	·216775	15	·530775	15	·764775	15	·918775	15	·992775
20	·225600	20	·537600	20	·769600	20	·921600	20	·993600
25	·234375	25	·544375	25	·774375	25	·924375	25	·994375
30	·243100	30	·551100	30	·779100	30	·927100	30	·995100
35	·251775	35	·557775	35	·783775	35	·929775	35	·995775
40	·260400	40	·564400	40	·788400	40	·932400	40	·996400
45	·268975	45	·570975	45	·792975	45	·934975	45	·996975
50	·277500	50	·577500	50	·797500	50	·937500	50	·997500
55	·285975	55	·583975	55	·801975	55	·939975	55	·997975
60	·294400	60	·590400	60	·806400	60	·942400	60	·998400
65	·302775	65	·596775	65	·810775	65	·944775	65	·998775
70	·311100	70	·603100	70	·815100	70	·947100	70	·999100
75	·319375	75	·609375	75	·819375	75	·949375	75	·999375
80	·327600	80	·615600	80	·823600	80	·951600	80	·999600
85	·335775	85	·621775	85	·827775	85	·953775	85	·999775
90	·343900	90	·627900	90	·831900	90	·955900	90	·999900
95	·351975	95	·633975	95	·835975	95	·957975	95	·999975
200	·360000	400	·640000	600	·840000	800	·960000	1000	1·000000 = F

As F for the above table is unity, the ratios given express the charge (f) held by any length from the testing end; and also the *difference* between any two intermediate values represents the fractional charge of the corresponding intermediate length in terms of the whole charge F taken as 1.

TABLE II gives the ratio $\frac{f}{F}$ from the testing end for every additional unit in the first 100 units of a cable of 1,000 units, having a uniform capacity and conductor resistance per N.M., and its distant end to earth — where F = 1.

No. of units from testing end. N	Calculated ratio $\frac{f}{F}$ (1)	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$ (2)	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$ (3)	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$ (4)	No. of units from testing end. N	Calculated ratio $\frac{f}{F}$ (5)
1	·001999	21	·041559	41	·080319	61	·118279	81	·155439
2	·003996	22	·043516	42	·082236	62	·120156	82	·157276
3	·005991	23	·045471	43	·084151	63	·122031	83	·159111
4	·007984	24	·047424	44	·086064	64	·123904	84	·160944
5	·009975	25	·049375	45	·087975	65	·125775	85	·162775
6	·011964	26	·051324	46	·089884	66	·127644	86	·164604
7	·013951	27	·053271	47	·091791	67	·129511	87	·166431
8	·015936	28	·055216	48	·093696	68	·131376	88	·168256
9	·017919	29	·057159	49	·095599	69	·133239	89	·170079
10	·019900	30	·059100	50	·097500	70	·135100	90	·171900
11	·021879	31	·061039	51	·099399	71	·136959	91	·173719
12	·023856	32	·062976	52	·101296	72	·138816	92	·175536
13	·025831	33	·064911	53	·103191	73	·140671	93	·177351
14	·027804	34	·066844	54	·105084	74	·142524	94	·179164
15	·029775	35	·068775	55	·106975	75	·144375	95	·180975
16	·031744	36	·070704	56	·108864	76	·146224	96	·182784
17	·033711	37	·072631	57	·110751	77	·148071	97	·184591
18	·035676	38	·074556	58	·112636	78	·149916	98	·186396
19	·037639	39	·076479	59	·114519	79	·151759	99	·188199
20	·039600	40	·078400	60	·116400	80	·153600	100	·190000

As F for the above table is unity, the ratios given express the charge (f) held by any length from the testing end; and also the *difference* between any two intermediate values represents the fractional charge of the corresponding intermediate length in terms of the whole charge F taken as 1.

As, however, the distant end of this imaginary cable is to *earth*, the static charge held by the whole length (L) when the testing current is applied by K_2, will be only half of the charge which the cable would hold were its distant end *free*—*i.e.*, $F = \frac{L f_1}{2}$ distributed in proportion as the potential falls regularly with the resistance from a maximum T at the testing end to zero at the distant end E. For instance, the first half of such an imaginary cable has three times the charge of the distant half, and on this basis, Table I gives the charge *from the testing end* as it increases with every additional 5 *units* in a cable supposed to be 1,000 units long, having a uniform capacity and conductor resistance per N.M., and its distant end to earth; the total charge of such a cable being taken as *unity*; while, to enable breaks at no great distance to be localised with exactitude, Table II gives the charge from the testing end as it increases for *every additional unit* in the first 100 units.

In the original description of this test, published in the ELECTRICAL REVIEW of June 7th and 14th and July 5th, 1901, other more elaborate tables are given to indicate the position of the break; but one object of this description is to show that with the aid of these revised tables, and a *simple proportion* sum, the evaluation of the break's position, from the foregoing test results, is very speedily effected without any further formula.

In reality, of course, R l includes only a relatively small amount of *cable conductor resistance* (P, p), the greater part (p, E) existing in the ruptured end which has no capacity. The fall of potential is nevertheless the same and quite regular throughout the entire resistance.

By measuring, therefore, the charge (C) taken up by the cable portion represented by the area T, t, p, P, and calculating therefrom its capacity (f), we can obtain the *ratio* between f and the calculated total charge (F) represented by the area T, E, P, which an imaginary cable—having the same mean C.R. and capacity per N.M. as the cable under test—would hold if its distant end were to earth and its length equivalent to $\frac{R l}{r_1}$ N.M.

The values f and F must here be understood to express only the *relative capacity* of the part and whole of the cable respectively *to hold a static charge under the special conditions of the test*, as already explained.

By referring the ratio $\frac{f}{F}$ to the *nearest* value in the annexed Tables I or II, we find by a proportion sum the exact distance (N) of the break in units from the testing end *on the supposition that the resistance* R l *is that of a cable* 1,000 *units long*. As the break will be at the same *proportional distance* in a cable of any other length, and the length (L) of the imaginary cable is in the present instance $\frac{R l}{r_1}$ N.M. instead of 1,000, the actual distance of the break from the testing end is—

$$\frac{N}{1{,}000} \times \frac{R l}{r_1} \text{ N.M., or } \frac{N}{1{,}000} \times R l \text{ (ohms).}$$

Correcting the above Distance for any Revised Value of the C.R. *or Capacity per* N.M.—The distance of the break is strictly correct only when the C.R. and capacity employed for the calculation are the mean per N.M. of the ruptured portion under test. Until the approximate distance is found these will not always be precisely known, and a correction may be necessary. For instance:—The C.R. per N.M. (r_1) is the mean for the whole unbroken cable as obtained from recorded measurements. As the greater part of this may be in deep, and, therefore, colder water, and the ruptured portion under test in shallow and warmer water, the mean revised resistance per N.M. (r_2) of the latter will be higher. What this is may be approximately determined by reducing the factory C.R. per N.M. at 75° F. of the unbroken cable—or, better still, of the ruptured portion—to the observed or estimated temperature of the average depth of the broken part. Thus the revised length (L r) $= \frac{R l}{r_2}$ N.M.

Again:—If the mean capacity (f_1) for the whole unbroken cable, as at first employed, differs from the mean of the broken portion under test (f_2)—obtained (after finding the approximate distance) from the factory value given on the "splice sheet"—F must also be corrected for the revised value f_2. Thus:—Revised capacity F $r = \frac{L r \times f_2}{2}$ mfd.

The revised ratio, therefore, becomes $\frac{\quad}{F_r}$, for which the revised value N_r is found from the table.

Revised distance of break $= \frac{N r}{1{,}000} \times \frac{R l}{r_2}$ N.M., or

" " " $= \frac{N r}{1{,}000} \times R l$ ohms.

(*To be continued.*)

Lifeguard Trials.—The Public Service Commission for the First District of New York, U.S.A., has announced that two public tests of fenders and wheel guards suitable for use on the street railroads of Greater New York, will be held within the next three months. Manufacturers and inventors of guards from all countries will be invited to participate in these tests, and to present their inventions for practical demonstration. The purpose of the tests is to enable the Commission to decide what types of guards are best adapted for use in New York, to the end that the devices which most commend themselves may be recommended for installation by the operating companies there.

The decision to hold these tests is the outcome of the first year's experience of the Public Service Commission. Organised on July 1st, 1907, the Commission had not been in office three months before the humanity of its members was shocked by the terrible mortality due to accidents on the street railroads. Under the Public Service Commission's law, it is made the duty of street railroad companies to report to the Commission at once every accident occurring on their lines resulting in loss of life, serious injury to persons, or great damage to property.

It was found that the street railroads of Greater New York were killing men and women at the rate of 40 or 50 a month, and for the last six months of 1907 the number killed in this way aggregated 288, an average of 48 a month. To end such havoc of life and limb became the Commission's immediate task. It had general investigations made of operating conditions on all lines of street railroads, and appointed a Special Committee on safety devices to receive and consider suggestions, inventions and existing devices for the prevention of accidents. All these have been carefully examined, and so far as possible given model tests in the offices of the Commission, but the Committee soon determined that it would be necessary to hold public tests in a practical way. Its recommendation that the Commission provide for such tests was favourably considered, and the forthcoming competitions, which will take place at Schenectady and Pittsburg, were arranged for.

THE COLLIERY EXHIBITION.

(*Continued from page* 155.)

Mr. Austin Hopkinson, Delta Works, Guide Bridge, exhibits a new electric coal cutter of the chain type. This is a strong and substantially built machine, running on skids, with the "face" and "goaf-side" fenders or guides constructed from flat-bottom steel rails.

Messrs. Ackroyd & Best, Ltd., Morley, near Leeds, exhibit numerous miners' safety lamps and cleaning machines. The former are all electrically lighted, and the latter electrically driven. Another interesting exhibit is the underground electric safety re-lighter, shown in figs. 10 and 11. It will be remembered that some little time ago one of H.M. Inspectors of Mines objected to the use of these re-lighters on the ground that the lamp must be inspected by a competent person before being re-lit. The coal company which was using them took the case to arbitration and lost, but, notwithstanding this, we understand that there are ways and means of overcoming the objection, or rather of meeting it, and their use is rapidly extending. As will be seen, the re-lighter consists of two main portions, the top forming the lamp igniting chamber, whilst the bottom contains the accumulator and induction coil, the wires being carried from the accumulator and coil in steel tubes.

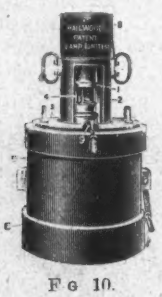


Fig 10.

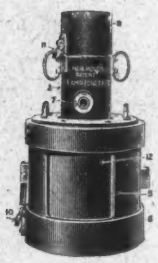


Fig. 11.

The lamp chamber (1) is formed of an inner cylindrical chamber securely bolted to the accumulator chamber, with an accurately fitting cylindrical cap or cover (2) fitted over the inner lamp chamber. This cap or cover is free to slide or revolve in the flange ring (3).

Lamp admission openings (4) are formed in both chamber and cover; the lamp to be ignited is passed through these openings and placed upon an insulated contact piece in the base of the inner chamber, the outer cover is then slid or revolved through half a circle, viz., until the lamp admission opening on the cap is at the rear of the apparatus, the corresponding lamp admission door of the inner lamp chamber remaining in its original position. This movement of the outer cover has the effect of making the lamp chamber perfectly flame-tight, because any flame which might by any possible means be formed in the lamp chamber would, to get out of the apparatus, be compelled to travel between the walls of the inner lamp chamber and the walls of the outer cover, a distance of from 8 in. to 12 in., and as the space between these walls is less than the distance between the wires of the standard lamp gauze, the whole of the heat of the flame would be absorbed by the large surface of cold iron over which it would pass. It will thus be seen that should any gas get into the apparatus and be ignited by any means, the products of the explosion would be allowed to escape harmlessly, and this without bursting the chambers.

The rotation of the outer cover (2) automatically causes (only at the moment when the inner lamp chamber is perfectly sealed) an iron guard plate to move clear from the front of a protected electric switch, and also causes this switch to come forward and make contact on the lamp, thereby closing the electric circuit and allowing the electric current to flow through the lamp and ignite the wick (the spark being formed inside the lamp). It should be noted that if the lamp be absent, the electric circuit will not close, and there can, therefore, be no spark or flame formed in the apparatus.

The lower chamber for containing the accumulators and induction coil is formed of a cylindrical chamber (12), the sides and top and bottom being all cast in one piece, and the only opening being that for the admission of the accumulators and coil; surrounding this chamber is a cylindrical cover (5) running in flanged rings (6), this cover being also provided with an opening for the admission of the accumulator. When the accumulators and coil have been fixed in position, the cylindrical door is revolved through half a circle and padlocked to the bottom flanged ring, and need not be disturbed again for months. It will be obvious that any gas which might by any possible means become ignited in this bottom chamber would most certainly have all the heat taken out of it, because, owing to the increased diameter of this chamber, the flame would have to travel a distance of about 18 in. between two closely fitting cold iron surfaces. This, also, whilst permitting the products of combustion to escape harmlessly, relieves the pressure, and the chambers are therefore not subjected to the strain they otherwise would endure.

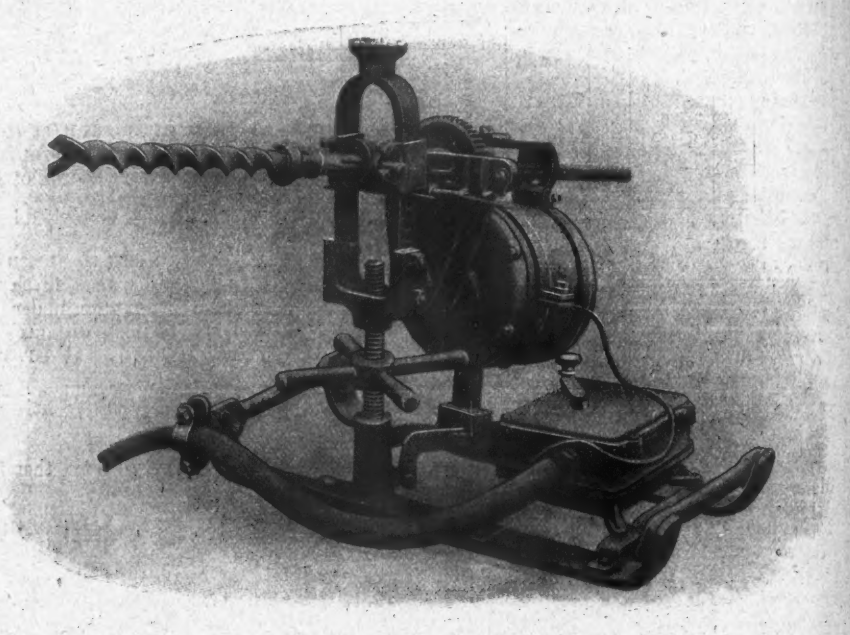


Fig. 12.—Electrically-Driven Coal Drill.

The lamp chamber is provided with a spring lock (9) which securely locks the chamber directly the lighted lamp is withdrawn. Each apparatus is supplied with a sufficient number of such keys to supply all the responsible persons in each underground district selected by the manager. The keys to the padlocks (10) and (11) are only in the keeping of the lamp man on the surface. The electric switches are easily got at by the lamp man for adjustment by unlocking the padlocked chamber. A thick glass-covered observation peep-hole (7) is provided for the purpose of observing when the lamp is ignited.

Messrs. Davidson & Co., Ltd., Belfast, show one of their single inlet "Sirocco" mine fans 49 in. in diameter with a capacity of 26,000 c.f. of air per minute against a water-gauge of 3 in., when running at a speed of 420 r.p.m.,

direct coupled to a Mather & Platt 20-H.P. direct-current motor. The switchgear is contained in a substantial gas-tight iron case suitable for underground use.

Messrs. Haniel & Lueg, of Düsseldorf, in addition to an interesting exhibit of a model of a complete installation for shaft sinking by the freezing process, also show a model of an electrically-driven mine pump, the principal feature of which is that instead of double-acting pumps with a common valve box and air vessel, each pump is independent and is provided with a separate air vessel.

Messrs. The Hardy Patent Pick Co., Ltd., Sheffield, exhibit examples of their specialities in mining tools, coal-washing, screening and conveying plant, and their air-driven rock drills, the latter being shown in operation, with air supplied by an electrically belt-driven Alley and McLellan air compressor. A new coal drill driven by a small electric motor is also shown (see fig. 12, page 196). This, as will be seen, consists of a small motor driving the drill through gearing, mounted upon a stand, which is itself mounted along with the motor starter, upon skids, so that it may easily be dragged or pushed along the pavement. This should prove to be a handy machine for quickly drilling shot holes in the coal on a longwall face.

Messrs. R. H. Longbotham & Co., Ltd., Ings Foundry, Wakefield, exhibit a model of a complete electrically-driven screening plant in motion. The plant consists of two tipplers, two jigging screens, and two picking belts, each 58 ft. long, fitted with lowering jibs 20 ft. long, which are lowered into the truck to minimise the breakage of the coal being loaded. The nuts and peas are discharged from each screen on to two vibratory screens, which sort out the peas, the latter falling through a shoot on to a cross belt conveyor which takes this size of coal direct to a washery, the nuts being delivered on to a fourth belt. The whole plant is worked by a 60-H.P. motor with the exception of the loading jibs, which are worked by a 5-H.P motor, through friction clutches. The jibs are balanced by cast-iron weights. A novel feature of the plant is that the floor is of ferro-concrete instead of wood, and is not only fireproof, but binds the whole of the steel framed structure together in such a way that there is no perceptible vibration when the plant is running at full speed. This firm also exhibits a portable haulage gear driven by a 30-B.H.P. three-phase motor through treble reduction gearing. The controller is of the barrel type, and the resistances are neatly packed away under the frame, which is built up of rolled-steel joists and channels and mounted upon four cast-steel wheels and axles, the gauge being 4 ft. 8½ in.

The Ackroyd & Buckley patent steam superheater is also shown. Unlike other superheaters, this one is constructed of steel boiler plates in the form of a chamber which is divided up into divisions by internal diaphragms and takes the place of the back wall behind a Lancashire boiler. The claims made on its behalf are that it has no tubes, and cannot get blocked by priming; it will not burn out, and gives a more regular and uniform superheat than is possible with a a tube superheater

Messrs. The Ingersoll-Rand Co., 165, Queen Victoria Street, E.C., have a very interesting exhibit of air compressors and air-drills. The most interesting item, however, is the Temple-Ingersoll electric air-drill, shown in fig. 13, which is taken from a photograph of the drill at work in the mine. The remarkable property of these drills is the enormous saving of power; for instance, the 3 E size machine, equivalent to an ordinary 2¼-in. air cylinder, if driven in the ordinary way from a fixed compressor and pipe line, would require at least a 14-H.P. motor to work the compressor, whereas with the Temple-Ingersoll, a 3-H.P. motor only is fitted. With the large machine 5 C, equivalent to a 3¼ in. air cylinder, a 5-H.P. motor is provided against an 18-H.P. fitted to an ordinary compressor. As will be seen, the drill closely resembles the ordinary rock drill; it is mounted in the usual way, and works with a percussive action. Close to the drill, and connected to it by two short lengths of hose, is a small electric-driven air compressor, or, more properly, an air pulsator mounted on a small truck. The latter consists of an electric motor geared to a horizontal shaft with cranks on each end, which drive a pair of single-acting trunk pistons making alternate strokes in the vertical air cylinders. One of these cylinders is connected by the hose to one end of the drill cylinder, and the other end of the drill cylinder is connected by the other hose to the other pulsator cylinder. The air, therefore, in the drill cylinder, hose and pulsator cylinders, remains there constantly, and merely alternates backwards and forwards according to the movement of the parts. To start the apparatus the drill is held until a sufficient pressure — about 30 to 35 lb. per sq. in.—is developed in the pulsator, drill cylinder, and hose, when the drill is released. It is evident, therefore, that now if one pulsator piston be rising in its cylinder the other will be falling, and as a consequence the pressure upon one side of the drill piston will be increased, while the other is proportionately decreased, and the difference of pressure will cause the drill to move and make its stroke. Just before the end of the stroke, the movement of the pulsator pistons is reversed, and the pressure is reversed to the other side of the drill piston, causing a stroke in the other direction, and so on, the drill making a double stroke for each revolution of the pulsator crankshaft. The drill cylinder is generally similar to the ordinary air drill, but is simplified by the removal of the operating valve, valve chest and ports. The compressor or pulsator cylinders are also very much simplified. There are no valves for either inlet or discharge, and no

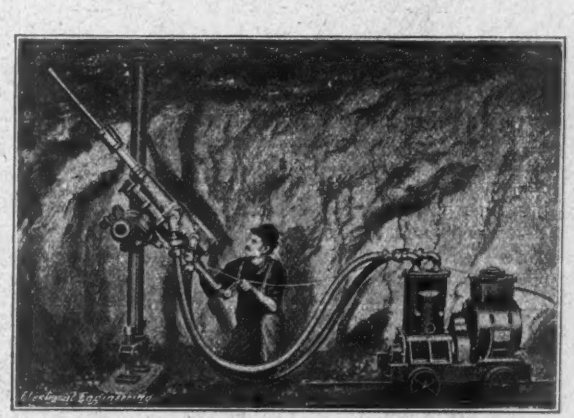


Fig. 13.—Electro-Pneumatic Rock Drill.

water jacketing is required, nor is there the slightest need for it, as the heating of the air during the compression stroke is compensated for by the cooling which takes place on its being expanded. It must be remembered that it is the same air that is being alternately compressed and expanded, consequently the enormous heat losses attending the usual air-compressing plant are absent in this case. There is further no trouble in regard to freezing, a frequent cause of annoyance with the ordinary air drill. There are only two valves in the whole apparatus, one a pull-back valve fixed to the drill cylinder to remove the pressure from the front of the piston when it is necessary to withdraw the drill, and the other a small air inlet valve on the pulsator. When the latter is working, the air pressure alternately rises and falls considerably below the mean, and at a certain point is below atmospheric pressure. It is at this point that the small valve comes into operation and admits more or less air as may be required. There is no doubt but that this will be the drill of the future. It will be remembered that in our issue of November 18th, 1904, we described it in its original form.

(*To be concluded.*)

Argentine.—A concession for the electric lighting of the city of San Juan by means of 150 arc lamps, as well as the supply of electricity, has been obtained. The water-power of the falls of the River Estero de Sonda will be utilised; these falls will give nearly 1,000 H.P. A three-phase 10,000-volt plant will be installed. The falls are 15 km. from the city. The plant will be supplied by the Siemens-Schuckert Co.

NEW ELECTRICAL RECORDING TARGET.

ONE of the most troublesome and costly features of rifle practice at fixed targets is the "marking," or the signalling of the position of each shot on the target to the firing-point. This item alone costs the National Rifle Association on their Bisley ranges some thousands annually, besides entailing much delay and occasionally vexatious errors. Attempts to

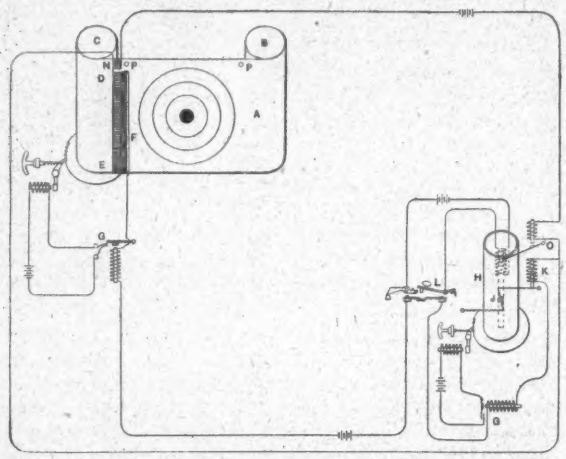


FIG. 1.—SINGLE-SHOT TARGET AND RECORDER.

provide a means of electrically signalling the shots to the firing-point have often been made, generally involving the use of a sectionalised target, each section of which, say 3 in. square, is connected with transmitting and recording apparatus by means that are sufficiently obvious. Unfortunately, however, it is not sufficient to know the position of a bullet-hole within a few inches; it must be known within a millimetre or two. Moreover, the enormous kinetic energy of the bullet, most of which is expended at the moment of impact upon the target—some 2,000 foot-pounds in the case of the 0·303 service cartridge—cannot be withstood for any reasonable period of time by a sectionalised target, and the latter consequently is soon a wreck. Even with 3-in. square sections, no fewer than 577 wires from the target to the firing-point would be required, and with 2-in. squares some 1,300 wires would be necessary, for a target 6 ft. square, such as is used at 600 yards. Even then, too, if more than one bullet were to strike the same section, only one would be recorded, whereas if one bullet hit the corners of several sections, it might appear as three or four, and the record, except for single shots, would be unreliable.

To overcome these difficulties, Mr. Sydney A. M. Rose, an electrical engineer, and proprietor of a factory in Melbourne, has just patented an extremely ingenious system of electrical recording, which immediately reproduces at the

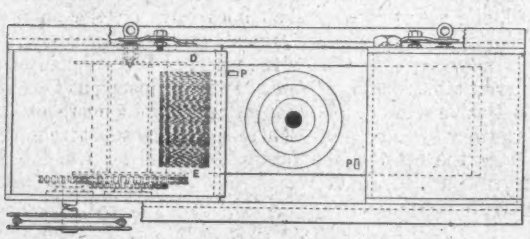


FIG. 2.—VOLLEY-RECORDER.

firing-point the exact position of the bullet-hole, in the case of individual shooting, or the positions of any number of bullet-holes, in the case of a target for volley-firing or rapid fire, each hole being indicated within one-sixteenth of an inch. The former can be effected with only three wires; the latter requires some 1,153 in the case of a 6-ft. target. Naturally, a result such as this, which implies the individual examination of 1,327,104 sections each measuring $\frac{1}{16}$ in. square, or ·003 sq. in. in area, requires a radical departure from methods previously adopted. The accompanying illustrations, based upon the patent specification drawings, will show how it is done.

Fig. 1 represents diagrammatically a system adopted only for recording single shots. The targets are printed on a roll of paper A, wound upon a drum B, whence it is wound over a drum C, only one shot being fired at each target. The keyboard D E consists of a series of spring fingers at $\frac{1}{16}$ in. centres, connected with a continuous resistance F, one end of which is connected through an insulated wire with the recorder at the firing-point, while the other lead is brought to a common terminal running from top to bottom of the row of fingers.

After each shot, the target is wound on the drum C; but in passing under the fingers, the bullet-hole (if any!) allows one or more fingers to drop, making contact with the common terminal and allowing a current to flow through the recording circuit. This current actuates two relays, G G, which close local circuits through electromagnets and simultaneously lock the drum C and the recording drum H. The strength of the current depends upon the vertical position of the bullet-hole with regard to the keyboard D E; and a recording pencil J, actuated by a solenoid K or other means, is pulled up to a point depending upon the current, and therefore corresponding with the exact vertical position of the bullet-hole, the apparatus being calibrated to secure this result. All this is instantaneous and automatic. The operator now presses a key L, which first momentarily closes the circuit of an electromagnet inside the drum H, causing the pencil J to strike a roll of paper which is carried over the drum, and afterwards interrupts the main circuit, allowing the local circuits to open, and releasing the drums.

An auxiliary wire M is connected with a row of keys N and a recording magnet and pencil O, whose function is automatically to indicate on the recording paper the positions of the gauge-points P P, so that the record may be referred to a perfectly definite base.

It will be seen that the operation is automatic with the exception of pressing the key L. Were it not for the possibility of two holes falling in the same vertical line, this

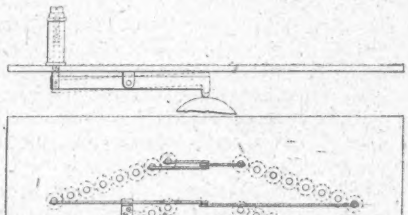


FIG. 3.—ARRANGEMENT OF MARKERS.

apparatus would indicate and record any number of holes on one target. It will be observed, too, that a target of paper or similar material is used, and that each target is shot at only once; thus there is no possibility of error through doubling shots in the same hole. The original targets can be kept as accurate records for a time, or can at once be patched in the usual way, and used over and over again.

There are drawbacks to the system above described, which will readily occur to the experienced electrician, the principal, perhaps, being the calibration of the apparatus controlling the position of the recording pencil, which may be upset in various ways. These drawbacks are not present in the target used for rapid or volley firing.

In this case (fig. 2) the keyboard D E is not connected with a resistance; each finger is connected with a separate wire running all the way to the firing-point. At the latter a row of marking-points or pencils is provided, each carried by a lever, the outer end of which can be pulled by a small electromagnet in circuit with one of the aforesaid wires. The manner in which the markers at the firing-point, and the fingers at the target, can be arranged is indicated in figs. 3 and 4; by suitably alternating or staggering them, or arranging them *en échelon*, the distances between centres can be made about $\frac{1}{16}$ in. The result is as follows:—As the original target, upon which a volley has been fired, is wound continuously upon the drum, the fingers drop into the holes

in the paper, and close their respective circuits, thus reproducing simultaneously at the firing-point marks which appear as on fig. 5 ; here A represents the actual target (with gauge-points), B is the record, and C is a transparent gauge which is applied to B, showing the score as at D, the gauge-points ensuring exact registering. The record of each bullet-hole is obviously made by several markers, so that even if one failed from any cause, the indication would be made ; and the record is such that a very close measurement can be made, and the score very closely determined. In case the centre of a hole falls so near one of the circles that doubt exists as to whether it is, say, an inner or a magpie, the original target can always be appealed to, but as a rule the record would suffice. It will be seen that thousands of shots could be individually recorded on a single target in this way. As before, the original target can be patched *at leisure* and used again ; there is no need to keep the riflemen waiting while the score is signalled and the target patched, as at present.

The inventor proposes to revolve the drums—which must move together at the target and firing-point—by a stretched wire or cable, carried on pulleys ; this would present some inconveniences at long ranges, but it would not be difficult to introduce a synchronous arrangement, electrically-driven. The connecting cable would be of the paper-insulated multiple-wire type, such as is everyday practice in telephony, and it could be taken round a whole series of targets and into the head office at the range ; it is only in use at the moment when a target is being rolled off, and consequently one cable will readily serve very many targets. The cost of the apparatus is very small compared with the enormous outlay on marking under present conditions, to say nothing of the inconvenience and delay incurred. Undoubtedly there are many difficulties to be overcome ; the construction of a target of paper or other light, thin and flexible fabric which shall withstand the elements, especially in the larger sizes, is not a trifling problem, and the combination of the comparatively delicate mechanism of the transmitting apparatus with the drums, &c., required to handle such large sheets calls for considerable ingenuity and mechanical skill. The inventor, however, is a practical engineer, and appears to have thought out the device very thoroughly before patenting it all over the world. A target has already been constructed to his order by a British firm of electrical manufacturers, and the experiments which will be carried out will serve to demonstrate both the advantages of the system and the directions in which modification is necessary to obtain the best results. Figs. 6, 7 and 8 show approximately the appearance of the completed target and recording apparatus. We understand that numerous improvements in detail have already been introduced into the design, and that the results obtained are quite satisfactory. The invention marks a great advance upon previous attempts to solve the problem, which, in view of the growing interest in rifle shooting, is one of considerable importance, and we trust that Mr. Rose will achieve the success that his invention certainly merits.

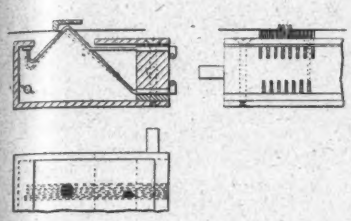


Fig. 4.—Details of Contact Fingers.

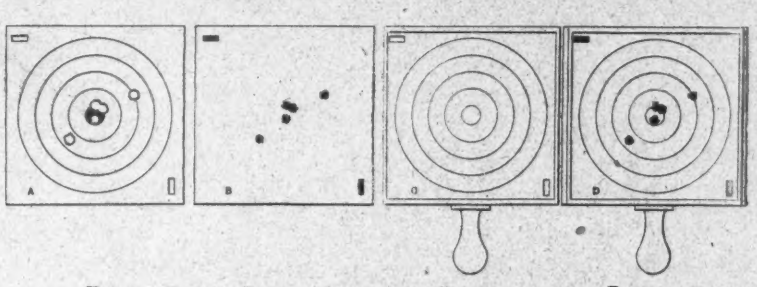


Fig. 5.—Target, Record, Gauge, and Gauge applied to Record.

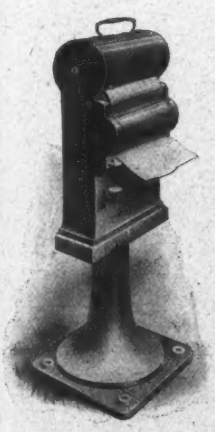


Fig. 6.—Single-Shot Recorder.

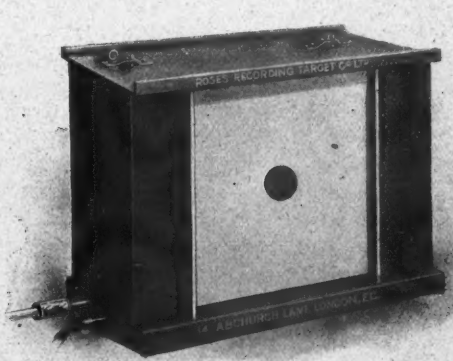


Fig. 7.—Volley-Firing Target, Complete.

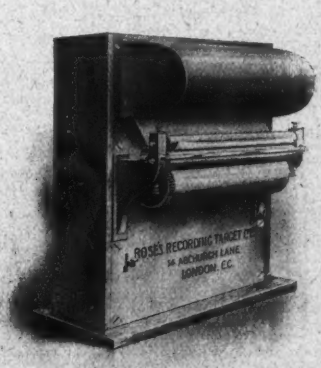


Fig. 8.—Volley Recorder.

THE CONGRESS OF THE TRAMWAYS AND LIGHT RAILWAYS ASSOCIATION.

Rail Corrugation.

(An abstract of this lecture, by Prof. C. A. Carus-Wilson, was given on page 159.)

In discussing the lecture, on the 24th inst., Mr. H. M. Sayers remarked that Mr. J. A. Panton in a paper read before the I.E.E. in March, 1907, had emphasised the importance of flange action, but the author had gone further and evolved a theory covering the various influences at work. The influence of torsional vibration on axles had been brought forward some years earlier. It had been suggested that the characteristic of the series motor might be responsible for corrugation, as a suitable manipulation of the controller would cause the axle torque to overcome the adhesion between wheel and rail, thus producing skid and roll. He could not see why sand was a necessary factor in corrugations, nor why successive cars should corrugate rails in identically the same positions.

Mr. J. R. Salter doubted the recurrence of the sets of conditions mentioned at all times of the year so as to cause corrugation in a similar way at the same places. He suggested that possibly the slip observed on the Croydon line was due to corrugations already there.

Mr. J. S. Warner considered that any periodic oscillation due to torsional axle stresses would be damped out by the weight on the

car axles. Among the various conditions requisite for corrugations to appear, it was only possible to remedy check-cutting flanges, and this only by adopting radical changes in the construction of trucks, &c.

MR. STEPHEN SELLON considered that the author had exaggerated the conditions of flange wear, and that such excessive wear was not possible in average practice. Furthermore, he could not see how the corrugations of different cars, at various speeds, could always synchronise as regarded position and pitch of corrugation. He blamed the solid track construction adopted by the municipalities as the main cause of the trouble, as it had not occurred to any extent on old tramways and railways. He suggested that the author had not considered the wear on the opposite rail head which must take place before such excessive flange wear was possible in the case shown.

PROF. CARUS-WILSON, in replying, said it had been suggested that differential driving would remedy corrugation, and it might be so, but it was early as yet to go in for such a drastic change. Skewed axles and flange action were a contributory cause of corrugation; but flange action might occur with accurately constructed trucks. As regarded the part played by sand, he advanced a tentative explanation. It was probably the fact that a certain amount of sand and grit became engraved into the surface of the rail head, and when the torsional action described in the lecture occurred, the gritty surface was ground away at intervals—the ground patches having a reduced coefficient of friction as compared with the original gritty surface. The wheels of following cars, with similar torsional stresses in their axles, would, he submitted, recover themselves by slipping on the patches where the coefficient of friction was reduced, and thus perpetuate the corrugating action in the same places. His experiments on routes free from corrugation showed that the same slip occurred as on the Croydon route; he agreed that a damping effect due to the weight of the car occurred, and its effect was to lengthen the period between the successive slips. He thought if the present truck construction was continued, it would not be possible to reduce flange thickness, as it was uncertain which way the wheels would move. As regarded Mr. Sellon's remarks on flange wear, the example cited in the lecture was actually taken from a wheel in use at the present time, partly on curves, and it was, therefore, quite possible to obtain the amount of flange wear shown. As regarded the action of the opposite wheel on the tread of its rail, this was dealt with in the lecture. He agreed that it was necessary to have a succession of cars at a similar speed in order to obtain corrugation, and if widely varying speeds occurred no corrugation would be found. Corrugations had been found on steam railways and early tramways in this country where the conditions had been suitable.

NEW PATENTS APPLIED FOR, 1908.

Compiled expressly for this journal by W. P. THOMPSON & Co., Electrical Patent Agents, 322, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

14,803. "Improved electrical accumulator carrier." A. H. GOODALL. July 13th.

14,808. "Improvements in sparking plugs for internal combustion engines." A. E. LAMKIN and H. KNOTT. July 13th.

14,811. "Improvements in telegraphic relays." J. A. FLEMING. July 13th.

14,814. "Improved accumulator electrodes." C. VOGEL. July 13th. (Complete.)

14,817. "Improvements in or connected with apparatus for electrically heating running water." G. FULLER and L. FULLER. July 13th.

14,851. "Improvements in or relating to the manufacture of metallic filaments for electric incandescent lamps." C. TRENZEN and F. R. POPE. July 13th.

14,852. "Improvements in or relating to the manufacture of bodies of metallic titanium, particularly for filaments of electric incandescent lamps." C. TRENZEN and F. R. POPE. July 13th.

14,853. "Improvements in or relating to the manufacture of metallic filaments for electric incandescent lamps." C. TRENZEN and F. R. POPE. July 13th.

14,867. "Improvements in the manufacture of electric incandescent lamp filaments." BRITISH THOMSON-HOUSTON Co., LTD. (General Electric Co., United States.) July 13th.

14,876. "Improvements in actuating mechanism for oscillating sparking magnetos." S. GRIFFIN. July 14th.

14,897. "Improved method of and apparatus for compounding alternating-current generators." M. BRESLAUER. (Date applied for under Sec. 91 of the Act, July 15th, 1907, being date of application in Germany.) July 14th. (Complete.)

14,904. "Improvements in diaphragms for use with Röntgen ray apparatus." J. R. COLLINS. July 14th.

14,910. "Improvements in protective covers for electric glow lamps." SIEMENS-SCHUCKERTWERKE G.m.b.H. (Date applied for under Sec. 91 of the Act, June 1st, 1908, being date of application in Germany.) July 14th. (Complete.)

14,925. "Improvements in or relating to apparatus for electrically igniting miners' safety lamps in mines." W. BEST, A. E. BEST and R. O. BEST. July 14th.

14,934. "Improvements in electric time switches." G. ROSENBUSCH. July 14th.

14,950. "Improvements in electrical release devices for the control of electrical energy." H. S. MARTIN. July 14th.

14,956. "New or improved device for illustrating the action of magneto-electric ignition systems for explosive engines." J. SCOTT, LORD MONTAGU OF BEAULIEU and G. C. SHERRIN. July 14th.

14,961. "Improvements in the manufacture of metallic filaments for electric incandescent lamps." W. MAJERT. July 14th.

14,962. "Composition for the manufacture of metallic filaments for electric incandescent lamps." W. MAJERT. July 14th.

14,963. "Improvements in metallic filament electric incandescent lamps." W. MAJERT. July 14th.

14,967. "Improvements in and relating to electro-magnetically controlled switches." BRITISH THOMSON-HOUSTON Co., LTD. (General Electric Co., United States). July 14th.

14,995. "Improvement in enclosed electrical switches." H. W. COX. (Application for Patent of Addition to No. 27,792/07.) July 15th.

14,998. "Improvement in the magneto-electric machines." A. SCHANSCHIEFF. July 15th.

15,013. "Improvements in electric motor-starters." G. C. FRICKER. July 15th.

15,030. "Improvements in or relating to incandescent electric lamps." F. WILKINS. July 15th.

15,031. "Improved electrolytic galvanising process." C. BIANCO. July 15th.

15,039. "Improvements in and relating to electro-magnetic interrupters." C. W. ZIPPERER. July 15th.

15,047. "Improvements relating to alternating electric current distribution systems." J. S. PECK. July 15th.

15,052. "Improvements in and relating to electric transforming systems." W. B. WOODHOUSE. July 15th.

15,054. "Improvements in or relating to telegraph cables." R. K. GRAY. July 15th.

15,079. "Improved method of decarbonising filaments for electric metallic-filament lamps." H. ARON and A. GEIGER. July 16th. (Complete.)

15,080. "Improved method of manufacturing metallic filaments for electric incandescent lamps." H. ARON and A. GEIGER. July 16th. (Complete.)

15,116. "Improvements in arc lamps." L. SHAW. July 16th.

15,130. "Improvements in and relating to electric motor-generator sets for supplying arc lamps for searchlights and for other apparatus." BRITISH THOMSON-HOUSTON Co., LTD. (Allgemeine Elektricitäts Gesellschaft, Germany.) (Application for Patent of Addition to No. 4,379/05.) July 16th.

15,177. "Improved method of signalling by means of electric bodies." SIEMENS BROS. & Co., LTD. (Siemens & Halske Act.-Ges., Germany.) July 17th. (Complete.)

15,186. "Improvements in and relating to coin-controlled mechanism for gas, electricity and other meters and like apparatus." J. A. STONEHAM and F. A. STONEHAM. July 17th.

15,238. "Improvements in electric primary batteries." R. SOWINSKI. July 18th.

15,268. "Improved method and means for controlling or braking electrically operated machinery." G. W. BIRKETT. July 18th.

15,275. "Improvements relating to the regulation or control of electric motors." JOHNSON-LUNDELL ELECTRIC TRACTION Co., LTD., and W. A. PAICE. July 18th.

PUBLISHED SPECIFICATIONS.

Copies of any of these Specifications may be obtained of Messrs. W. P. THOMPSON & Co., 322, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1907.

ELECTRIC MOTOR CONTROL SYSTEMS AND APPARATUS THEREFOR. Britsh Thomson-Houston Co. (General Electric Co., U.S.) 6,528. March 18th.

TELAUTOGRAPHS. F. Ritchie. 9,009. April 18th.

CONTROLLER MECHANISM FOR ELECTRICALLY-OPERATED CRANES, LIFTS, AND THE LIKE. British Thomson-Houston Co. (Allegemeine Elektricitäts Ges., Germany.) 11,926. May 22nd.

ELECTRICAL SIGNALLING SYSTEM FOR RAILWAYS AND APPARATUS THEREFOR. C. Enderlin, W. Landwehr and K. Schulz. 14,183. June 19th.

IGNITION DEVICES FOR INTERNAL COMBUSTION ENGINES. C. F. Blundell. 14,259. June 20th.

ELECTRIC TELEGRAPH APPARATUS. G. G. Brown. 14,262. June 20th.

THERMALLY ACTUATED ELECTRICAL CONTACT MAKERS. H. S. Stoneham. 14,263. June 20th.

APPARATUS FOR SEPARATING IRON AND OTHER MAGNETICALLY PERMEABLE METALS FROM FLOUR, GRAIN AND THE LIKE. F. King. 15,058. June 29th.

ELECTRICAL HEATING APPARATUS FOR USE IN APPLYING HEAT TO LIQUIDS OR SUBSTANCES IN HEATING WATER AND IN BOILING, COOKING, STERILISING AND OTHER OPERATIONS AND FOR HEATING SMOOTHING IRONS AND FOR OTHER PURPOSES. W. S. Adlard. 15,079. July 1st.

ELECTRIC PRIMARY CLOCKS. A. C. Stray. 15,100. July 1st.

EQUALISING DEVICES FOR ALTERNATING-CURRENT CIRCUITS. J. S. Peck. 15,335. July 3rd.

ELECTRIC LAMPS FOR CARRIAGES, MOTOR CARS AND THE LIKE. C. A. Vandervell. 15,966. July 11th.

ELECTRIC IGNITION APPARATUS FOR INTERNAL COMBUSTION ENGINES. Electric Ignition Co. and F. H. Hall. 16,911. July 24th.

MAGNETO-ELECTRIC IGNITION APPARATUS FOR INTERNAL COMBUSTION ENGINES. Electric Ignition Co. and F. H. Hall. 16,912. July 24th.

REPLY OR TELL-TALE TELEGRAPH FOR INDICATING AUTOMATICALLY THE CONDITION OF A MACHINE OR MOVING CONTRIVANCE AT A DISTANCE ESPECIALLY ADAPTED FOR USE IN SHIPS. W. E. Lake. (Brown Automatic Indicator Co., U.S.A.) 16,959. July 24th.

ELECTROLYTIC CURRENT RECTIFIERS. A. S. Hickley. 17,457. July 30th.

ELECTRIC TIME SWITCHES. W. H. Laird. 18,790. August 20th.

DYNAMO-ELECTRIC MACHINES. British Thomson-Houston Co. and W. F. Dawson. 18,881. August 21st.

ELECTRICAL FUSES OR CUT-OUTS. E. J. Coller. 21,255. September 25th. (Post-dated March 25th, 1908.)

COMBINED ELECTRIC AND PERCUSSION PRIMERS FOR ORDNANCE. S. A. de Castilho. 21,403. September 26th.

CONTROL SYSTEMS FOR ELECTRICALLY-PROPELLED VEHICLES. W. Cooper. 21,551. September 28th. (Date applied for under International Convention, October 3rd, 1906, being date of application in U.S.A.)

1908.

TEACHING INSTRUMENT FOR WIRELESS AND OTHER TELEGRAPH OPERATORS. F. J. Chambers. 6,101. March 19th.

ELECTRIC INCANDESCENT FILAMENT LAMPS. C. Pauli. 6,409. March 3rd. (Application for Patent of Addition to No. 27,541 of 1907.)

TELEGRAPHICALLY TRANSMITTING SIGNALS BY MEANS OF A PERFORATED STRIP. Siemens Bros. & Co. (Siemens & Halske Akt.-Ges., Germany). 8,015. April 10th.

INTERRUPTERS FOR ELECTRICAL IGNITION. The firm Robert Bosch. 8,190. April 13th. (Date applied for under International Convention, March 23rd, 1908.)

FIELD MAGNETS FOR MAGNETO-ELECTRIC GENERATORS. H. Ruthardt. 8,547. April 16th. (Date applied for under International Convention, April 16th, 1907.)

SWITCH PLATE FOR THE AERIAL WIRES OF ELECTRIC TRAMWAYS. A. G. Boon. 9,865. May 6th.

ELECTRIC IGNITION DEVICES FOR INVERTED INCANDESCENT GAS BURNERS AS USED IN STREET LIGHTING. F. T. Cotton. 10,856. May 19th.

APPARATUS FOR ELECTRIC SIGNALLING. Siemens & Halske Akt.-Ges. 1,533. January 22nd. (Date applied for under International Convention, January 23rd, 1907, being date of application in Germany.)